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Introduction

Ian Johnston
President, REAAA

The REAAA Commitment to Knowledge Sharing

REAAA was conceived in 1973 and born in 1976. It now has more than 1,400 members from some 35 countries. It exists to promote the science and practice of road engineering and related professions in the region. Our guiding principles revolve around the sharing of ideas, experiences, knowledge and technology. We do this formally by conducting conferences, short courses and workshops and by publishing newsletters and this Journal. Less formally we provide a mechanism for networking between professionals, government agencies and private companies, throughout our region.

The Heads of Road Authorities (HORA) Meeting

A recent initiative of REAAA was to invite the most senior people in road asset management in the region to a meeting with the principal purpose of identifying common problems and sharing experiences in dealing with those problems. Over 22 countries accepted our invitation and two Ministers, two Deputy Ministers and more than 40 senior officers joined the international governing Council of REAAA in Kuala Lumpur in April 2002. The Road Engineering Association of Malaysia (REAM, the official Chapter of REAAA), assisted by the Public Works Department of Malaysia, the Malaysian Highway Authority and supported by many individuals and companies, combined to make this a most significant event.

To ensure open, frank discussion of the issues facing road asset managers in the region the HORA meeting was held in camera. However, a separate public seminar and exhibition was convened to facilitate a broader exchange of experiences. This special issue of the Journal contains the papers presented to that public seminar and serves as a very useful overview of the situation in a cross section of the countries in the region.

For many of the papers included here we had the full text. However, for some, we had only a Powerpoint presentation and we have done our best to convert that into a readable paper. We accept responsibility for any errors we may have made in this process and offer our apologies to the authors. I am indebted to the Journal Editor, Mr. Kieran Sharp, for his enormous efforts in putting this material together.

The Key Outcomes from the HORA Meeting

The meeting was very open and constructive and, while it identified a number of common problems shared through the region, it is not surprising that it did not identify universal solutions.

As the inaugural HORA meeting, the principal objective was to set an 'agenda' for REAAA in its attempts to increase the effectiveness of its knowledge transfer efforts. While a large number of specific problems were identified they can be grouped into four quite fundamental regional issues.

Rate of Growth of Infrastructure

The majority of countries in this region are growing extremely rapidly, both in terms of population and in terms of economic development. This provides an imperative for the rapid development

of transport, particularly road, infrastructure. The demand for infrastructure growth, in turn brings into focus three types of problem:

- How to finance the rapid expansion of the network. Here, the issues relate to private sector funding, cost reduction through institutional reform, and the raft of charging mechanisms that may be applied to raise dedicated revenue.
- The urgent need for better tools and processes to resolve the conflicts created by trying to maximise the economic and social development benefits of infrastructure investment while minimising the potential loss of life and environmental impacts of that infrastructure.
- How to bring about institutional reform and, particularly, how to manage the boundaries between traditional institutions dealing with different aspects of the problems alluded to above.

Managing Traffic Growth

Accompanying the rapid development of road infrastructure is an explosion in the number of vehicles seeking to use the road system and in the number of road users. Many nations in the region not only have very high proportions of two-wheeled vehicles (both motorised and non-motorised) but have developed unique types of passenger carrying conveyances. Such disparate mixes were never experienced by the now motorised world so there is little historical experience to draw upon. Congestion, and its attendant pollution, are creating major problems. The motorised world is turning towards intelligent transport systems (ITS) and one specific question for countries in our region is what role ITS may play in solving the operational needs.

Maintenance Management

Rapid infrastructure growth and an explosion in vehicle use brings with it the problem of maintenance. There can be a temptation to invest more in new infrastructure than to seek to gain maximum life from infrastructure when the financial resources are limited. The decision support tools by which countries make choices require further development and the adaptation of existing tools for rapidly motorising countries requires special effort. This extends to a need for training to enhance the expertise of staff.

At a more particular level, the overloading of axles is a fundamental problem which runs counter to standard asset management maintenance strategies.

Road Safety

The World Health Organisation has identified injury from road crashes as the next "global epidemic". The faster the rate of growth in traffic the faster the rise in the road toll. In many countries in our region the high frequency of two-wheeled vehicles and other special vehicles compounds the difficulty of protecting people in the event of crashes. Again, the most effective countermeasures from the motorised world may be much less effective in the unique environments in our region.

Where to Next?

The reader will note that answers are not provided to the above list of questions. This inaugural HORA meeting was designed to reach agreement on the key issues countries in the region face in common. It serves as an agenda for REAAA in its future efforts. One decision already taken is that the HORA meetings will continue, with their future focus specifically directed towards seeking solutions.

Encouraging Sustainable Development in the Roads Sector Through Greater Adoption of 'Commercial' Principles

Charles M. Melhuish

Lead Transport Sector Specialist

Asian Development Bank

1. Background and Role of the ADB

The Asian Development Bank (ADB) was established pursuant to a resolution on Asian economic cooperation adopted at the First Ministerial Conference on Asian Economic Cooperation held in December 1963 and to Resolution 62 (XXI) on the Asian Development Bank adopted by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), formerly the United Nations Economic Commission for Asia and the Far East (ECAFE), in 1965. The Second Ministerial Conference on Asian Economic Development held in Manila in 1965 adopted and opened for signature the Agreement Establishing the Asian Development Bank. The Agreement entered into force on August 22, 1966. The inaugural meeting of the Board of Governors was held in Tokyo, in November 1966. The Bank opened for business in December 1966 and commenced lending operations in 1968.

The Bank makes loans and equity investment for the economic and social advancement of its developing members; provides technical assistance to prepare and carry out development projects and programs and regional and advisory services; promotes investments of public and private capital for development; and responds to requests for assistance in coordinating development policies and plans of its members. In addition to providing loans, equity investments and technical assistance, the Bank has identified five strategic objectives in its Medium-Term Strategic Framework, viz. to promote economic growth; reduce poverty; improve the status of women; develop human resources (including population planning); and help bring about sound management of natural resources and the environment.

As of 31 December 31 2001, the total authorised capital stock of the Bank was US\$43.8 billion, of which US\$43.6 billion had been subscribed by the Bank's 59 members. Portugal was admitted as the 60th member on 2 April 2002 and Democratic Republic of East Timor as the 61st member on 23 July 2002.

Table 1 summarises the distribution of ADB loans by sector from 1968 to 2001. Included in the Table is the distribution of loans for technical assistance projects. Table 2 presents a break-down of these loans in the transport sector, whilst Table 3 presents a further break-down of loans in the transport sector over the last five years.

It is widely accepted that roads play a major role in development and help to reduce poverty. However, to realise their potential contribution to the development of a country, the roads must be properly maintained. In many of the ADB's developing member countries (DMGs) in particular, the standard of road maintenance is poor, often because the level of road maintenance funding is inadequate.

To this end, in December 2001, the ADB published "An Approach to Sustainable Funding of Road maintenance", which presented the findings of a regional technical assistance, RETA 5871 Road Fund Strategy, which examined the problem of road funding and the development of purpose solutions. Within the support of a team of consultants, studies were undertaken of road funding experience in DMCs and options were formulated for improving road funding and defining frameworks to ensure the efficient use of road maintenance budgets.

This paper presents an overview of the extent and type of ADB funding in the Asian region and the key elements which can contribute to greater sustainability and performance in the road sector. These include the implementation of effective management systems, institutional reform, and road financing and the role of the private sector.

2. Economic Growth in the Asian Road Sector

Road Statistics for the region (Southeast Asia, South Asia and the Peoples' Republic of China) are presented in Table 4.

The growth rate in Gross Domestic Product (GNP) since 1999, including the project growth in 2002 and 2003, is presented in Table 5, whilst Table 6 shows the percentage share of Transport and Communications in the Gross National Product of ten countries in Asia (Asian Development Outlook, 2002).

Table 1
Distribution of ADB Loans by Sector (1968-2001)

Sector	Total	Technical Assistance
Transport	19	12
Agriculture & Natural Resources	19	27
Energy	20	10
Industry and Non-Fuel Resources	3	8
Finance	14	3
Social Infrastructure	16	18
Telecommunications	2	1
Multisector	5	2
Other	2	19

Table 2
Distribution of ADB Loans in Transport Sector (1968-2001)

Transport Sector	Total	Technical Assistance
Road & Road Transport	72	65
Airports and Civil Aviation	3	5
Ports and Shipping	11	19
Rail	14	11

Table 3
Transport Sector Operations (1968-2001)

Year	Loans		Technical Assistance	
	Number	Amount (\$M)	Number	Amount (\$M)
1997	12	933.0	25	16.048
1998	12	1480.0	19	12.125
1999	9	918.0	25	13.776
2000	14	1285.4	28	14.749
2001	12	1416.0	22	9.998

Table 4
Road Statistics for Asian Region

Country	Year	Road Network (000 km)	Growth (% p.a.)	Vehicles (million)	Growth (% p.a.)
Bangladesh	1980	5.7		<0.1	
	1990	13.7	9.2	0.3	11.6
	1999	140.0	33.7	0.5	6.6
India	1980	1,190.0		5.0	
	1990	1,970.0	5.2	18.7	14.1
	1999	3,300.0	5.9	37.2	7.9
Pakistan	1980	40.1		1.1	
	1990	118.1	11.4	2.8	9.8
	1999	227.0	7.5	4.6	5.7
Sri Lanka	1980	24.6		0.3	
	1990	26.0	0.6	0.7	8.8
	1999	95.0	13.8	1.3	10.9
China	1980	888.5		3.8	
	1990	1,028.3	1.5	6.3	5.2
	1999	1,359.0	3.2	19.8	13.6
Indonesia	1980	142		3.9	
	1990	284	7.1	8.9	8.6
	1999	415	4.3	18.2	8.4
Malaysia	1980	29		2.3	
	1990	54	6.5	5.4	8.8
	1999	65	1.9	23.2	15.7
Philippines	1980	152		1.1	
	1990	160	0.5	1.7	4.4
	1999	200	2.5	3.5	8.3
Thailand	1980	28		1.7	
	1990	45	4.9	7.5	16.0
	1999	129	11.0	20.1	10.3
Vietnam	1980	81		0.1	
	1990	87	0.8	1.5	25.2
	1999	200	8.6	7.1	17.2

Table 5
Growth Rate of GDP (% per Year)

Country	1999	2000	2001	2002	2003
East Asia	7.6	8.3	3.9	5.2	6.2
Southeast Asia	3.8	5.9	1.9	3.4	4.3
South Asia	5.7	4.2	4.9	5.4	6.4
Central Asia	4.9	8.7	10.7	5.7	6.4
Pacific DMCs*	6.6	-1.0	-0.8	1.9	2.6
All DMCs	6.4	7.0	3.7	4.8	5.8

* Developing Member Countries.

Table 6
Percentage Share of Transport and Communications in GNP

Country	1998	1998	Country	1998	1998
Indonesia	6.9	7.5	Bangladesh	11.5	10.9
Malaysia	9.7	8.2	India	4.6	6.9
Philippines	5.2	6.6	Pakistan	9.1	9.3
Singapore	13.1	13.9	Sri Lanka	9.8	11.1
Thailand	7.5	9.5	PRC	19.5	16.5

Road Infrastructure is a key element in development. It alleviates poverty, it is a catalyst to economic growth and it enhances impact of other interventions to improve the poor's access to other assets, e.g. human, social, financial, and natural assets. Without roads, the poor are not able to sell their products on the market. Studies in India, for example, have shown that roads alone account for 7% of the aggregate output of the rural areas.

For the poor, the most dramatic impact of inadequate infrastructure may not be the lack of infrastructure per se but the lack of access to their infrastructure. Lack of access results in overall exclusion from opportunity and development.

2.1 Road Sector Performance

Post evaluation has determined that the overall performance of projects in the road sector have been favourable: 87% were rated as being generally successful or successful, 6.5% as partly successful and only 6.5% as unsuccessful. Transport sector projects, as a group, were the best performing sector compared to other economic sectors.

Despite the seemingly good performance of ADB-assisted road projects, many countries continue to have a high proportion of their highway networks in poor condition. Efforts therefore need to be directed to address the issues and causes of this continuing problem.

3. Management Systems

Management systems heavily influence the efficiency of resource utilisation in a highway organisation under the following five key areas:

- ☐ monitoring of highway performance;
- ☐ planning and resource allocation;
- ☐ choice of design and maintenance standards;
- ☐ competitive procurement; and
- ☐ quality control.

For the efficient monitoring of highway performance, detailed and up-to-date information on the network is required, user-friendly, computerised management information systems are needed, and regular collection and update of information is required. Very few countries have adopted such systems.

Planning and resource allocation systems require the incorporation of appropriate models which can be used to analyse the road databases in order that the planning and allocation of resources is conducted in an optimal manner. The efficiency of highway budgets can be significantly enhanced by the use of a strategic planning model such as HDM-4. In addition to strategic planning, these models can be used to develop annual road works programs and for individual road feasibility studies.

Design and maintenance standards can be used as planning tools to assist in the optimisation of geometric and pavement design standards at the project level or network level. Various design and maintenance standards can be adopted to maximise the works to be implemented with given budget constraints. It is suggested that management planning and design tools need to be adopted by all road agencies in the region.

In order to keep the costs of road operations at the lowest possible level, competitive tendering in a transparent process of known integrity should be used. Under ADB Guidelines, International Competitive Bidding (ICB)

is the preferred process, whilst Local Competitive Bidding (LCB) is acceptable for small-scale activities. While most countries use competitive tendering for construction contracts, many countries have yet to adopt it for maintenance activities. In other parts of the world, cost savings for maintenance undertaken by contract have been as high as 52%. The awarding of multi-year performance-based contracts creates strong incentives for efficiency.

While contractors and their supervisors have responsibility for quality control, there should also be an independent authority to ensure that quality standards are met. This function can be undertaken by the road authority itself or through consultants. It is important that quality assurance is undertaken objectively, transparently, and with integrity and that deficient quality is rectified. The capabilities and capacity of the local contracting (and consulting) industry, and the supervisory capacity of road authorities, vary widely across countries. Further development of the industry and quality control functions of road authorities will be needed before maintenance and construction activities can be outsourced effectively.

4. Institutional Reform

The road sector is widely considered to be a public sector obligation. To carry out its obligations efficiently and effectively, the public sector needs to operate more like the private sector, i.e. commercially, not as a tool of public employment policy.

Operations characterised by total separation between providers and users, and in commercially-run institutions, high priority is given to customer satisfaction. Road sector agencies therefore need to be publicly aware, accountable, transparent and maintain a high level of integrity in their day-to-day operations.

The public sector need to review business practices and adopt efficient measures. For example, in some cases it may be more appropriate to outsource some activities (e.g. construction, maintenance, planning, design, operation of plant and equipment, workshops, etc.). reviews of the role of the public sector have already been conducted in countries such as New Zealand, Australia, Malaysia, and the UK.

Operations remaining after restructuring need to be operated efficiently and business units should identify clear goals and objectives and develop corporate plans. Performance criteria should be established which are measurable and monitorable. To maintain efficiency, government agencies should compete with private sector companies in some operations or activities.

5. Road Financing

Most countries are experiencing a shortage of funds for investment and maintenance of roads. Some of the reasons for this are as follows.

- ☐ Government budgets are under pressure from demands from other sectors.
- ☐ Taxpayers are unwilling to tolerate increases in tax rates.
- ☐ Maintenance funding can be deferred with little visible impact in the short term.
- ☐ Road spending is large and often beyond budget capacity.

In many countries, roads are deteriorating prematurely and the full economic benefits from road investment are not being met. Analysis shows that the highest benefits are gained from routine and period maintenance and deferring maintenance can result in greater investment needs later. Many countries have a considerable maintenance backlog.

The establishment of a commercially-managed road fund requires consideration of the following:

- ☐ Scope of the road fund – which roads should be funded?
- ☐ The legal basis – new legislation is required.
- ☐ Oversight – a Road Fund Board should include all stakeholder representatives including government, private sector, non-Government organisations and the civil society. The Chairman should be independent because transparency is important.
- ☐ Management of the fund – separate road fund administration?
- ☐ Use of the funds – routine and periodic maintenance?

Sources of funding include road user charges such as vehicle registration/licensing fees, supplementary HGV fees, international transit fees, fuel levies, congestion charges, road pricing, contributions from donors, gifts and toll revenues. Administrative considerations – cost of collection; ease of avoidance or evasion; ease of collection, collection by contract, etc. – must be taken into account. Road tariff adjustments – a

formal mechanism for adjusting road tariffs should be adopted to keep pace with inflation and to ensure that sufficient revenue is generated

Operational considerations include the following:

- ☐ Day-to-day operation: collection of revenues, management of cash balances, withdrawal procedures, oversee use of funds by agencies, board meetings, accounts, etc.
- ☐ Disbursement: good financial discipline is required and different methods for achieving this are possible.
- ☐ Establish operating rules and regulations and publish them widely.
- ☐ the system must be subject to regular audit; transparency and integrity are essential.

5.1 Role of the Private Sector

As public sector budgets are often limited, additional resources can be sought from the private sector. Many countries in the region (e.g., Malaysia, Indonesia, Thailand, Philippines, Peoples' Republic of China, Hong Kong, India, etc.) have pursued BOT (build/operate/transfer) projects. However, following the 1997 Asian financial crisis, many projects failed to meet liabilities.

The limited success of BOT schemes was due to the limited number of locations where such projects could be bankable on a stand-alone basis. This is because the costs in the early years are high and insufficient revenue is often generated and there are high risks associated with their operations (cost overruns, delays, etc.).

BOT is best suited to high traffic volume (20,000 veh/day) applications because drivers on these routes are less deterred by high tolls because of the perceived advantages associated with using that route (the "willingness to pay" concept).

Support through public-private partnerships is therefore often required if the project is to be successful. For example, the Peoples' Republic of China has raised considerable capital resources through equity investments rather than debt financing. The use of cooperative joint ventures and the contracting of post-construction works eliminated project completion and initial traffic risks

The Manila North Luzon Tollway project is one of the few projects to successfully reach closure since 1998. This was due to the presence of a strong local sponsor and the lead role played by ADB.

The future for major investments in road infrastructure in the region is not bright due to the current political, legal and policy environment; foreign exchange risks and Government reluctance to accept these risks; and the 'bankability' of many countries in the region. The best prospects will be countries with strong domestic capital markets

The overall private sector investment in road infrastructure is likely to remain small with a likely return of less than 10% and probably much less. Whilst it could make a significant contribution at the margin, is not the panacea for highway financing needs in the future.

5.2 Private Sector Participation Without Private Finance

There is good potential for private sector participation without private finance to contribute to improving the efficiency of operation and maintenance activities. International experience indicates that a cost savings of up to 30% cost are achievable. Maintenance is the highest priority for expenditure because it provides the highest economic returns. However, infrastructure cost savings are far exceeded by vehicle operating cost savings.

The role that the ADB plays in Private Sector Participation (PSP) is as follows:

- ☐ Prepare the environment and procurement process for PSP.
- ☐ Broaden the understanding of the range of PSP options that exist in the roads sector.
- ☐ Assist with transport strategy formulation through the development of an appropriate institutional framework and institutionalisation of the framework.
- ☐ Identify priority projects for public-private sector funding and promote new project possibilities through pilot programs
- ☐ Invest in projects through ADB public and private sector windows and, where appropriate, provide guarantees.

6. Conclusions

This paper set out to demonstrate the role that key elements related to road reform can contribute to improving the impact of the road sector. Highlights include the following.

1. Road infrastructure, and access thereto, is a necessity for sustainable development.
2. Road sector project are amongst the most highly performing of any ADB supported projects.
3. Areas which could further be developed to increase the effectiveness of the roads sector include:
 - ☐ The introduction of effective road management systems and resource allocation procedures;
 - ☐ increased adoption of sound "business practices" within public and private organisations;
 - ☐ support for commercially-managed road funds to sustain and deliver appropriate quality infrastructure;
 - ☐ attracting greater private sector involvement in the delivery of road services whilst realising that "risk" capital for major projects may continue to be unattractive due to the recent financial crisis.

Reference

Asian Development Bank (2001). *An Approach to Sustainable Funding of Road Maintenance*. ADB, Infrastructure, Energy and Financial Sectors department (West), December.

Road Safety Trends in the Asia-Pacific Region

Charles M. Melhuish

Lead Transport Sector Specialist

Asian Development Bank

The vehicle fleet in the Asia-Pacific region is increasing rapidly compared to other countries such as the UK as shown in Figure 1. For example, typical recent growth rates are: India (17%), Vietnam (18%), Malaysia (15%) and the Peoples' Republic of China (PRC) (18%).

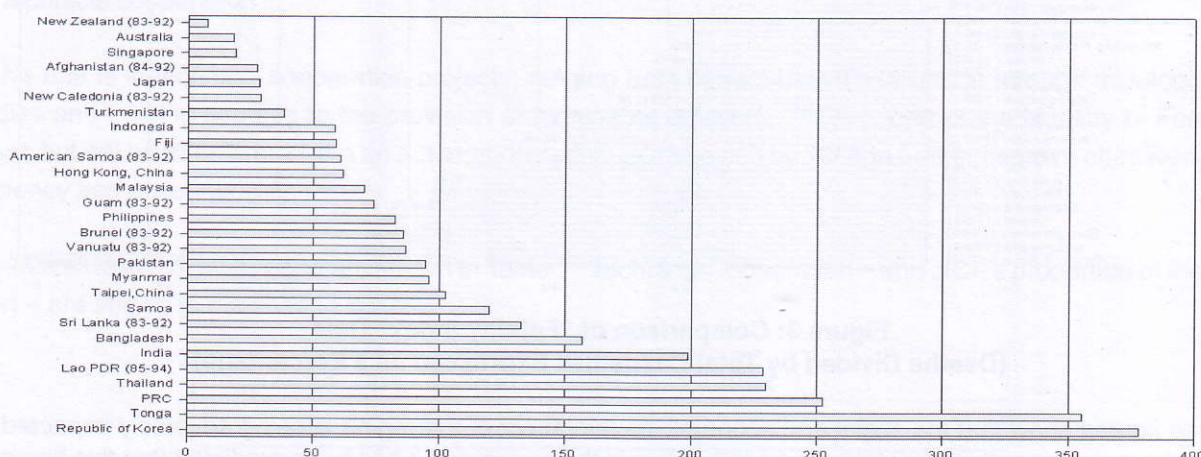


Figure 1: Percentage Change in Motorised Vehicle Fleet

However, in line with this increase, the number of road fatalities is also increasing rapidly. Figure 2 compares the traffic accident fatality trends in Asia with other regions of the world. It can be seen that the number of traffic fatalities in the Asian region since 1980 has increased by more than 70%, whilst the number of fatalities in highly-motorised countries has decreased by about 20% over the same period.

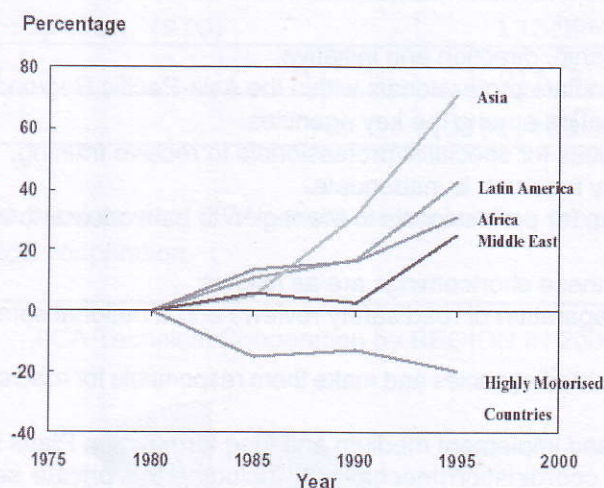
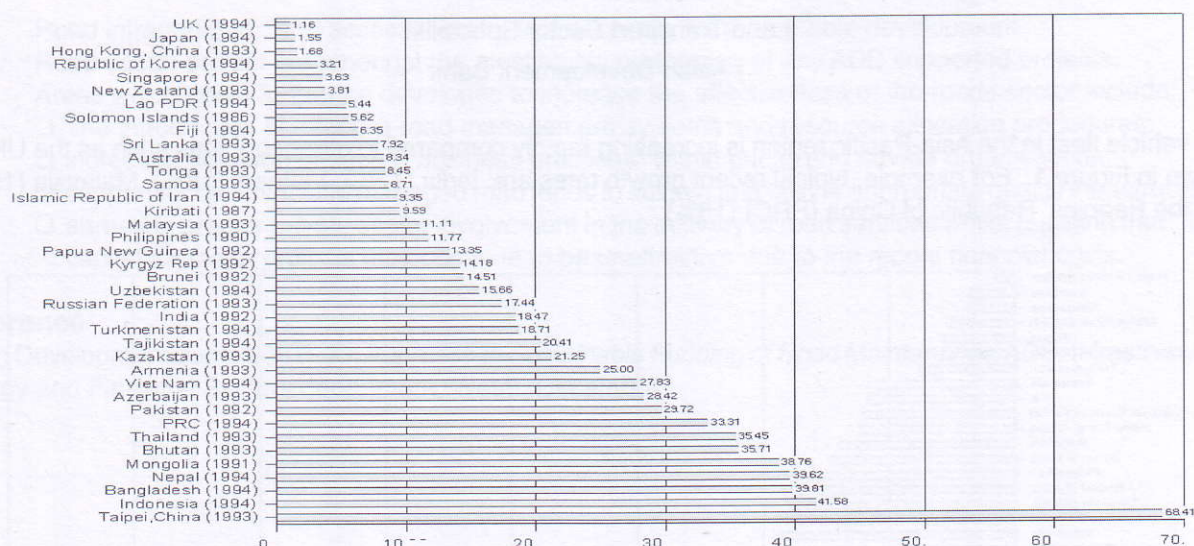


Figure 2: Comparison of traffic accident fatality trends, 1980-1995

More specific figures for five countries in the region are as follows.

Country	Years	% Increase
Malaysia	1983-1993	30
Thailand	1984-1992	18
India	1985-1992	45
Korea	1985-1991	79
Sri Lanka	1984-1991	44

Figure 3 compares “fatality index” data (deaths divided by total casualties expressed as a percentage) for countries both within the region and outside the region. It can be seen that the index for countries within the region is much higher than that for countries such as the UK and Japan.



**Figure 3: Comparison of “Fatality Index” Data
(Deaths Divided by Total Casualties Expressed as a Percentage)**

These figures show that the social and economic development of the region is being adversely impacted. In total, there are more than 300,000 road deaths/year in the region and it has been predicted that this figure will increase to 500,000 deaths/year within the next decade. More than US\$25 billion is lost each year in developing countries in the region

The major reasons why effective action to address this problem is being inhibited are as follows:

- ☐ Too few resources are being directed towards tackling the problem.
- ☐ Inadequate pooling and coordination of information.
- ☐ A lack of appreciation of the scale of the economic and social losses.
- ☐ The absence of preventive work.
- ☐ The need for greater leadership, direction and initiative.
- ☐ More effort is needed to stimulate professionals within the Asia-Pacific Region.
- ☐ There is insufficient coordination among the key agencies.
- ☐ There are too few opportunities for specialist/professionals to receive training.
- ☐ Dissemination of road safety research is inadequate.
- ☐ There is no easy mechanism for professionals in the region to gain access to information.

Suggested actions to address these shortcomings are as follows:

- ☐ Organise the systematic preparation of road safety reviews and a national seminar towards the end of this process
- ☐ Identify key individuals in the road agencies and make them responsible for road safety; provide the necessary training.
- ☐ Support efforts to develop and implement medium and long term Action Plans in each country.
- ☐ Establish an inter-Agency coordination mechanism, including the private sector and non-Government organisations.

Addressing the problems requires adoption of the policies and solutions promoted in ADB's *Road Safety Guidelines for the Asian and Pacific Region*, which were developed in 1998 as part of a regional technical assistance project funded by the ADB. The purpose of the Guidelines is to provide a source of reference and guidance to the region's senior decision-makers who have responsibility or road safety. The Guidelines cover 14 key issues affecting road safety, including a description of activities that can be undertaken to develop effective road safety measures in each area,. They are recommended reading for professionals in the field.

Reference

Asian Development Bank (1998). *Road Safety Guidelines for the Asian and Pacific Region*.

The Work of the Japan International Cooperation Agency (JICA)

Mr. Nobuhiro Koyama

Where JICA fits within the Japanese Overseas Development Assistance Program

The Japanese Overseas Development Assistance (ODA) Program comprises:

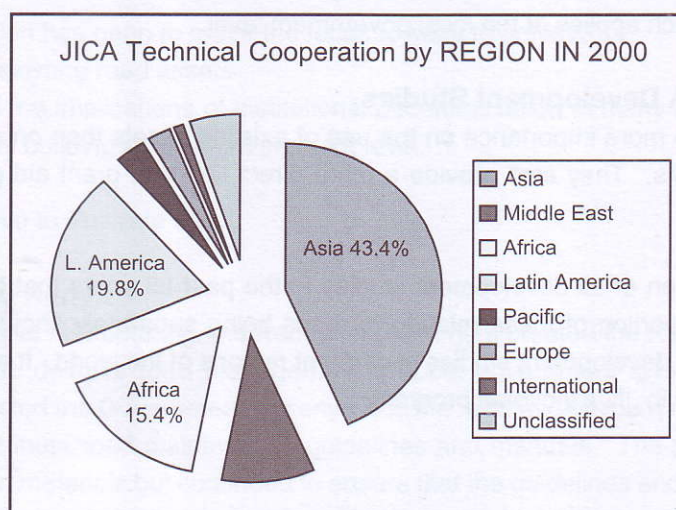
1. Grant aid
2. Government loans
3. Technical cooperation

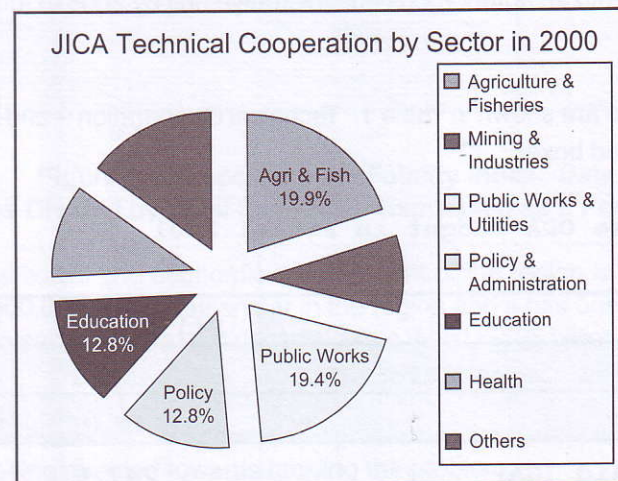
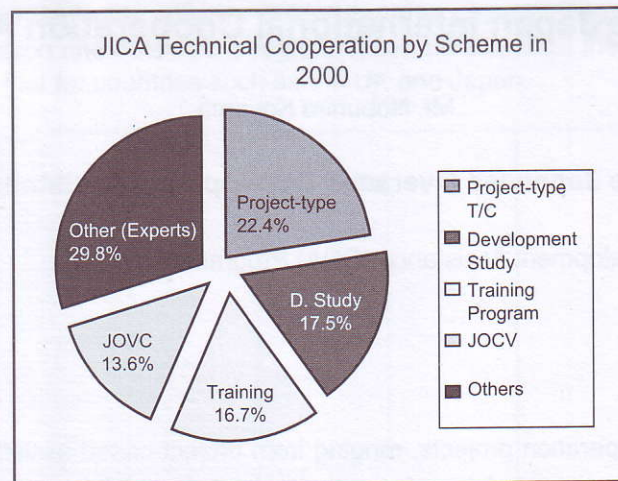
JICA's role is in technical cooperation projects, ranging from project-based assistance through development studies and training courses to the provision of experts as advisers. JICA is part of the Ministry of Foreign Affairs but will be transformed into an autonomous administrative unit by 2005 to further improve effectiveness, efficiency and accountability.

The overall levels of assistance are shown in Table 1. Technical Cooperation – and JICA's proportion of the TC effort – are shown in the shaded boxes.

Japanese ODA Budget in Fiscal 2001				
			Billion JY	%
Technical Cooperation (TC)			351.6	34.6
(JICA)			(179.0)	(17.6)
Grant Aid (GA)			247.0	24.3
Government Loan (GL)			284.5	28.0
Subscription (SIO)			132.2	13.0
Total			1,015.3	100.0
			(US\$8,460 million)	

Figures 1, 2 and 3 show the breakdown of JICA's technical cooperation program by region of the world, by sector and by type of technical cooperation.





It can be seen that Asia is by far the largest recipient of JICA assistance, accounting for well over 40% of the total.

The road sector has always been one of the most important sectors for assisting developing countries, based on the Japanese experience that transport infrastructure is vital for economic growth. (Transport infrastructure is included in the sector 'public works and utilities'.) This emphasis will continue in the future, although there will be a gradual shift from a hardware to a software oriented approach. In other words, there is an increasing tendency to place importance on institutions, the management of operations and the development of human resources, especially as each applies at the local government level.

The Importance of JICA Development Studies

Development studies place more importance on the use of existing assets than on new construction with its necessary large investments. They also provide a more direct link with grant aid programs for developing countries.

Table 2 shows the proportion of all development studies in the past 25 years that have related to transport infrastructure, with the proportion of these relating to roads being separately shown. In addition, the table provides the breakdown by development studies in different regions of the world. It reinforces the importance of transport projects in Asia in JICA's overall program.

JICA Development Studies (25 years: 1974-1999)						
	unit: studies					
	Grand Total		Transport		Roads	
		(%)		(%)		(%)
Grand Total	1,731	100.0	386	100.0	128	100.0
(%)	100.0		22.3		7.4	
Asia	1,025	59.2	232	60.1	80	62.5
ASEAN	662	38.2	164	42.5	63	49.2
Other Asia	363	21.0	68	17.6	17	13.3
Middle East	179	10.3	35	9.1	11	8.6
Africa	178	10.3	35	9.1	18	14.1
C.&S. America	278	16.1	70	18.1	17	13.3
Oceania	25	1.4	7	1.8	1	0.8
Europe	38	2.2	4	1.0	0	0.0
Others	8	0.5	3	0.8	1	0.8

Table 3 provides further detail on the types of development study in the road sector over the last 25 years.

Titles of Development Study in the Road Sector (1974-1999)		
Titles		%
(1) New Road Construction		41 32.0
(2) Bridge Construction & Improvement		24 18.8
(3) Road Rehabilitation & Improvement		12 9.4
(1)-(3) Total		77 60.2
(4) Road Network Master Planning		30 23.4
(5) Road Maintenance		5 3.9
(6) Road Disaster Prevention Measures		4 3.1
(7) Road Facility Improvement		2 1.6
(8) Road Traffic Management		2 1.6
(9) Road Traffic Safety		2 1.6
(10) Others		6 4.7
Total		128 100.0

The major shift in direction has been to move the focus to seek to achieve:

- An improved use of existing road assets
- An understanding of the implications of institutional decentralisation in many countries with a consequent emphasis on capacity building at local government level.

Two case examples serve to illustrate this.

Road Maintenance in Kenya

As part of its administrative restructuring, the Kenyan Government created the Kenyan Roads Board (KRB) in July 2000 in an effort to devolve road management to local government level and to encourage private participation. JICA assisted the Government of Kenya and the KRB to develop a road maintenance system as well as to draft and distribute road maintenance guidelines and manuals. The project did not stop with the production of the support materials but continued to ensure that the guidelines and manuals were promulgated to local government and private small companies with appropriate training.

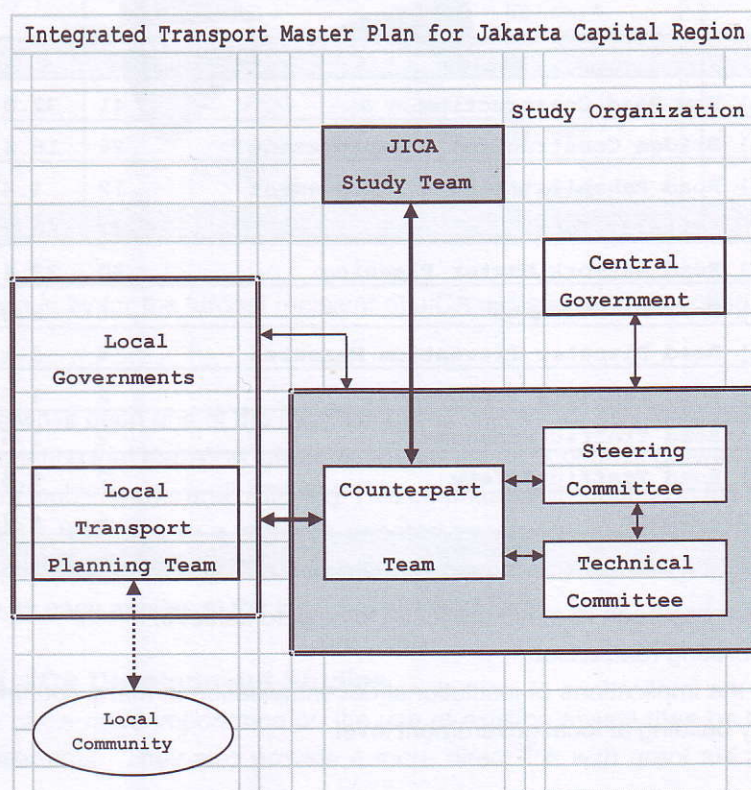
As the KRB was a new institution it had little by way of background experience or expertise. Further, the District Road Councils to whom the maintenance task was devolved had almost no capacity to fulfil their new role. So the key objectives of JICA assistance were to:

- Help define the responsibilities of each player within the KRB system
- Clarify the relationship between the KRB system and the external stakeholders

This project demonstrates very clearly the shift in the emphasis within JICA projects from the historical hardware to the improvement of institutional systems and processes.

Local Government Capacity Building in Indonesia

The Indonesian Government is currently developing an integrated transport master plan for the Jakarta capital region. Since the beginning of 2002 JICA has been assisting this project. What is unique is that the master plan covers eight local administration areas. The historical concentration of decision-making powers at central government level has left the local administrations with very limited planning capacity and inadequate transport databases. JICA has adopted a participatory approach involving both central and local governments to ensure that not only is the integrated transport master plan formulated but appropriate feasibility studies on priority projects are identified and conducted and, of greatest importance, human resources will be developed such that appropriate capacity will be built at the local institutional level. Figure 4 provides an overview of the capacity building mechanisms.



The Influence Of Highways On National Development, Economic Growth And Job Creation – The Malaysian Experience

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1. Introduction

Transportation infrastructure and its provision have a significant impact on economic prosperity and its development is reflected in the economic well being of the country. The Malaysian government, with a stated vision for a developed nation status by 2020, has invested heavily in the transportation sector and infrastructure, in bringing about greater economic growth. The government-private sector partnership concept, whereby the implementation of projects is carried out by the private sector, has been promoted and encouraged in earnest by the government through the privatisation policy. The involvement of the private sector has complemented the government's determined effort in developing and expanding the country's stock of infrastructure. Subsequently, the private sector has been entrusted with the role of engine of growth in the country's economic development in line with the liberation of economic activities.

The government has initiated privatisation as a national policy in 1983 as a new approach in national development. Development of toll highways in Malaysia has been given a tremendous boost during the last 12 years largely due to the government's privatisation policy. As the country moves towards development nation status, a good transportation infrastructure is a prerequisite, of which roads and highways play a major contributing role. Already there are over a thousand kilometres of toll highways in operation, with over a thousand kilometres more under construction or in the planning stage.

2. Roads Development in Malaysia

Malaysia achieved an average Gross Domestic Product growth of 9.5% per annum for the period 1988 to 1996. The high economic growth during this period was accompanied by a structural transformation of the Malaysian economy, from one relying on the production and export of primary commodities to a more modern industrial economy. More importantly, per capita income in nominal terms increased from RM1, 106 in 1970 to RM11, 835 in 1998. The higher than anticipated economic growth enjoyed by Malaysia has resulted in road capacity constraints as a result of a marked increase in vehicle ownership and usage. The government had launched several strategies under its Second Outline Perspective Plan (1991-2000) where due emphasis was given to increasing capacities and improving efficiency through integrated and co-ordinated planning. Transportation strategies focusing on multi modalism were introduced to promote greater use of public transportation with the systematic integration of the transport system and operation involving bus, train and rail services.

Road transportation accounts for 96% of the total passenger and goods transported in the country. As the government faced budgetary constraints in the highway network expansion programme, it has entrusted a bigger role to the private sector in line with the aims of the privatisation policy to further accelerate road development through fast track approaches. In 1998, Malaysia has a road network infrastructure of 64,949 kilometres of which 75.4% were paved roads. Toll highways in operation total 1,231km, comprised mostly of interurban highways.

Comprehensive planning for roads in the country only began after the formation of Malaysia, beginning with the First Malaysia Plan (1966-1970). During this period, the General Transportation Study (1967) laid the groundwork for consistent policies in road development. Whilst the early five-year plans were mainly for the development of roads in regional land schemes and undeveloped hinterland linking them to the national network, the later plans (fourth-seventh from 1980-2000) emphasised on upgrading and extension of the road system to facilitate the efficient movement of people and goods. A central feature of these plans was the development of interurban highways.

Until 1988, the government was directly involved in the construction and operation of toll highways, through the Malaysian Highway Authority. With the onset of privatisation on a large scale from 1988 onwards, all new toll highway projects were undertaken by the private sector. There are 25 toll highway concessions awarded to the private sector to date with 16 numbers already in operation. Most of the toll highways come under the jurisdiction of the Malaysian Highway Authority with respect to supervision, monitoring and adherence to the provisions of the concession agreements.

3. Développement of Toll Highway Projects

Road development is traditionally financed by the government through its consolidated funds or through borrowings from off shore sources. Having decided on the direct user charge in the form of toll collection to finance highway development projects, the government launched the concept of financing highway projects by the private sector through privatisation. As a result of the privatisation exercise, the North-South Expressway project (848 km) was privatised in 1988. The original concession agreement based on the build-operate-transfer method was for a period of 30 years. All other privatised toll highway projects awarded were also based on this method.

During the Seventh Malaysia Plan (1996-2000), the overall development of roads is guided by the Highway Network Development Plan that was formulated in 1993. Long-term integrated planning incorporating a total approach was adopted in the various development plans, where supply driven approach formed the basis for the expansion of road capacities to ensure availability of supply upon demand. The push by the government for highway development has provided significant opportunities for private sector involvement in the financing, construction, maintenance and management of road infrastructure.

Privatisation of toll highway projects actually began in 1984 with the award of the 15.3km North Klang Straits Bypass, located in the Klang Valley. However, the privatisation momentum only took off with the awarding of the North-South Expressway project. As demand for better and faster travel on roads increases, the private sector responded by investing heavily in toll road infrastructure projects. When fully completed, the total construction cost of the 25 privatised toll highway projects is estimated at approximately RM23.7 billion (USD 6.24 billion). This privatisation scenario was made possible with the enactment of several Acts of Parliament such as the Federal Roads (Private Management) Act 1984, to transfer government's business to the private sector. The list of highways in operation is shown in Table 1.

Table 1
List of Privatised Toll Highway Projects

No.	Highway	Length (km)	Opening Year	Concession Period (years/months)
1.	North-South Expressway	848.0	1982-1994 (staggered)	42
2.	Kuala Lumpur-Karak Highway	60.0	1984	32
3.	North Klang Straits Bypass	15.3	1984	25
4.	Penang Bridge	13.5	1985	24/8
5.	Jalan Kuching Toll Road	5.3	1987	15
6.	Kuala Lumpur City Roads	16.5	1991	26/8
7.	Kulim-Butterworth Highway	16.8	1996	32
8.	Shah Alam Expressway	35.0	1996	28/9
9.	North-South Expressway Central Link	48.0	1996	24/1
10.	Seremban-Port Dickson Highway	22.7	1997	35
11.	Malaysia-Singapore Second Crossing	45.7	1998	30
12.	Sungai Besi Highway	16.0	1999	32
13.	Cheras-Kajang Highway	11.7	1999	30
14.	Damansara-Puchong Highway	40.0	1999	33
15.	Ampang Elevated Highway	7.4	2001	33
16.	Western Kuala Lumpur Traffic Dispersal Scheme	26.0	2001	33
	Total	1227.9		

4. Financing of Toll Highway Projects

With the advent of privatisation, from 1988 toll highway development was undertaken solely by the private sector. The concession companies are responsible for obtaining all the finance, both debt and equity, necessary to construct, operate and maintain the highways. Therefore, the private sector's main responsibility in raising finance is to ensure the viability and bankability of the projects, having a financial model which

passes a sensitivity analysis test involving factors such as fluctuations in toll revenue, increase in cost, delays in construction and changes to the concession agreement.

There are various methods of financing available to the private sector involved in infrastructure projects. Financial consultants/advisers play a major role in guiding the concessionaires to the cheapest sources of funding. In this respect, the government's participation in the projects by way of the concession agreement has given projects the impetus to take off the ground. The various forms of government support formulated to suit the uniqueness of the various privatised projects, plays a critical role in deciding the course of the methods of financing available to the private sector.

By far the most common and traditional source of funds for financing toll highway projects is commercial banks, which are capable of committing funds for up to 15 years. For large amounts, an integrated proposal in the form of a syndicated loan from two or more lending institutions is common. Besides this, the private sector also have access to the Pension Fund, Employees Provident Fund and more recently through public participation by way of listing of infrastructure project companies (IPC) on the Main Board of the Kuala Lumpur Stock Exchange to finance their projects. However, to qualify for listing, the project will have to fulfil the guidelines issued by the Securities Commission.

The listing of IPC has enabled the concession company to tap the capital markets without a track record and this is of tremendous assistance in financing new projects by providing an alternative cost efficient mode of financing the project cost. The other methods of financing highway projects are through:

- ☐ Right issues: subscribed by the promoters of the projects.
- ☐ Commercial loans:
 - issue facility or fixed rate loan
 - notes issue facility
- ☐ Redeemable Cumulative Subordinated Loan Stock, which is subscribed by shareholders (shareholders loan).
- ☐ Equity contribution.
- ☐ Capital market.

5. Financing and Project Risk

The private sector's main responsibility in raising finance is to ensure bankability of the project by having a financial model, which passes a sensitivity test analysis involving the following factors:

- a. Fluctuation in Toll Revenue: the forecast normally considers three scenarios; base case, high case and low case.
- b. Increase in Costs: cost increases can be attributed to construction cost and interest rate cost. There should be an appropriate margin of comfort as a buffer against increase in material cost and inflation.
- c. Delays in Construction: Delays in completion of the project would mean a shortfall in revenue collection. Therefore the worst case versus the best case scenarios would have to be presented.
- d. Changes to Concession Agreement: The proposal would have to be robust enough to cater for changes to the concession agreement: for example, a deferment of toll rate increases.

Sensitivity analyses are used to determine the viability and success of the projects to variations in the data used in the analyses. The study will reveal the importance of each factors and its degree of risk and the companies will have to come up with options to overcome it. Reducing uncertainties is thus important, as a high-risk project requires a large volume of finance.

In Malaysia, the government support extended to toll highway concessions has reduced or helped in mitigating the risks associated with toll highway projects. The various forms of government support extended have played a major role in improving project viability and bankability. Examples of government support extended to concession companies are undertakings pertaining to toll rate structure, support loan, traffic volume guarantee, land acquisition, taking over of existing highway sections and undertakings by government on termination.

6. Economic Growth Through Industrialisation

The long-term macroeconomics target of vision 2020 envisaged that the Malaysian economy would achieve a continuous growth of at least 7% per annum from the year 1995 through to 2020. The drive towards economic growth will be led by the manufacturing sector, which currently contributed 23.4% of the GDP and which is expected to account for about 40% of the GDP by 2020. However, the thrust towards industrialisation

can only come about if sufficiently complemented and supported by a good transportation infrastructure network of which the road and highway network formed the main backbone.

On the national scale, the construction sector, including that of highway projects had contributed significantly to national development as its tentacles spread into all sectors of the economy. The construction industry of Malaysia has strong backward as well as forward linkages with the other sectors of the economy (Salih 1992, p8). The strong backward linkages with the manufacturing sector shows that growth in the construction sector will contribute to further growth in the manufacturing sector. The strong forward linkages the construction industry has with investment suggest that an investment-led growth economy will induce growth in the construction industry. (Khairuddin 2000, p8). The main economic indicators of Malaysia are shown in Table 2.

Table 2
Macroeconomic Indicators (RM Billion)

	1996	1997	1998	1999	2000
GDP and Components					
GDP at Constant 1987 Prices	183.3	196.7	182.2	193.3	209.4
GDP % Change	10.0	7.3	-7.4	6.1	8.3
Construction Sector (1987 prices)	8.6	9.5	7.2	6.9	7.0
Sector's % Growth	16.2	10.6	-24.0	-4.4	1.0
Demographic Indicators					
Population (million people)	21.2	21.6	22.2	22.7	23.2
Population Growth Rate	2.4	2.4	2.3	2.3	2.3
Total Labour Force (million)	8.6	9.0	8.9	9.1	9.6
Financial Indicators					
Consumer Price Index (1990 = 100)	125.4	128.6	135.4	139.1	141.3
Short Term Interest Rate (%) (3 months interbank rates)	—	8.70	6.46	3.18	3.3
Long Term Interest Rate (%) (12 months FD Bank rates)	—	9.33	5.74	3.95	4.1

One of the key factors that had contributed to the economic success of the past decade in the Malaysian economy was the excellent road and highway infrastructure. In addition to private sector investment, the government had allocated some 20% of its annual development expenditure for the country infrastructure, including roads. The Government's and the private sector's investment in toll highway development is shown in Figure 1.

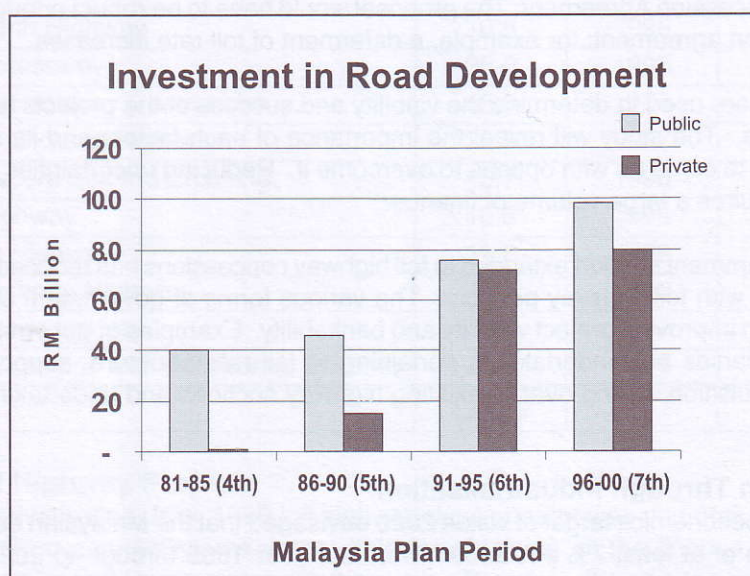


Figure 1: Government and Private Sector Investment in Toll Highway Development

7. Contribution of Construction Industry To the National Economy

The construction industry, including that of the highway sector has contributed significantly to the growth of the national economy. With the privatisation of highway projects taking off in a big way beginning in 1988, the industry has achieved an average growth rate of 23.2% over the period 1988 to 1997, until the economic crisis of 1997-1998 grinded it to a halt. The contribution to GDP at current prices by the construction industry has increased from RM2.87 billion in 1988 to a massive RM18.5 billion in 1997. Correspondingly, the industry's percentage share of GDP has increased from 3.1% in 1988 to 6.6% in 1997.

In line with its increasing importance, the construction industry employed 0.8 million people in 2000 or about 8.6% of the total workforce in the country. It has also contributed to a significant increase in the pool of expertise in the country with the opportunities created by the exposure to high technologies. The number of contractors registered with the Construction Industry Development Board, Malaysia currently stood at 39,340 firms, up from 20,518 in 1996, the majority of which (55%) are small contractors undertaking jobs up to RM100,000.00. The big contractors, who constitute 4.2% of the total number, undertook 74% of the total construction volume.

The number of professionals and tertiary degree holders in the construction industry has continued to increase due to the supply of new graduates entering the market. The job market and opportunities in the construction sector have continued to attract new entrants into the industry, as qualified and experienced personnel demand a premium in their salaries. Table 3 shows the change in the number of professionals and degree holders in the construction industry.

The construction industry has also contributed to a growth in the number of construction-related services companies. Table 4 shows the performance of the companies. It can be seen that the combined consultancy services has contributed to 35,000 job opportunities and there has been a major increase of 48% over 5 years.

Table 3
Professionals and Degree Holders in the Construction Industry

	1997	1998	1999
Professional Engineers	8,611	9,038	9,104
Professional Architects	1,471	1,479	n/a
Professional Quantity Surveyors	709	728	736
Degree Holders in Engineering	21,374	23,066	24,319
Degree Holders in Architecture	966	1,098	n/a
Degree holders in Quantity Surveying	382	441	460

Source: Board of Engineers, Board of Architects and Board of Quantity Surveyors

Table 4
Statistics of Consultancy Services

Types of Consultancy	1991	1992	1994	1996
Engineering	419	445	484	505
Gross Output (RM Million)	629	705	1,007	1,441
No. of Employees	11,041	11,393	13,193	16,295
Architectural	380	401	549	580
Gross Output (RM Million)	273	301	434	683
No. of Employees	4,255	4,686	6,435	7,457
Quantity Surveying	377	422	450	499
Gross Output (RM Million)	337	384	486	628
No. of Employees	8,275	9,031	9,968	11,201

Source: 1999 Yearbook of Statistics, Department of Statistics.

The country's investment in infrastructure has been instrumental in ensuring a continued high economic growth, supported by an accelerated rate of economic development in the country. Additionally, the stock of infrastructure, including road network and transportation has assisted in the rapid economic recovery of the country during the economic crisis of 1997-1998, without which the recovery would have been much delayed. Table 5 shows the GDP growth rate before and after the crisis. The data in this Table suggests that economic recovery has been more rapid in countries with a better infrastructure network, as well as other factors.

Table 5
Comparison of GDP Growth Rates

Country	1996	1997	1998	1999	2000
Malaysia	10.0	7.3	-7.4	6.1	8.3
Singapore	7.5	8.4	0.4	5.4	7.5
South Korea	6.8	5.0	-6.7	10.7	8.6
Philippines	5.8	5.2	-0.6	3.3	3.9
Thailand	n.a	-0.5	-7.8	0.9	2.5
Indonesia	n.a	4.7	-13.2	0.5	n.a

8. Benefits and Spillover Effects of Toll Highway Projects

Toll highways were among the projects identified to be carried out by the private sector, by way of the privatisation policy. This step has ensured an accelerated development of the highway network that in turn has acted as a catalyst for further development in the economy. The involvement of the private sector in road infrastructure projects has the effect of reducing the financial burden of the government. To date, the savings in terms of capital expenditure on highway projects amounted to RM16.7 billion. This represents the investment by the private sector in toll highway projects. Additionally, the government had also enjoyed savings in terms of annual operating expenditure, which amounted to RM555 million in 1999 for the toll highway projects.

The private sector plays an important role in promoting economic growth, as privatised entities are profit motivated and more flexible in pursuing corporate expansion goals. They are also more innovative in promoting services that were previously unknown and which have a commercial value. The economy thus gained from increased private sector efficiency, utilisation of gains for further expansion and an enhanced rate of infrastructure project implementation. It has thus led to the promotion of greater economic activities down stream.

Other benefits of highway privatisation are as follows:

- i) the development of a matured capital market and investment instruments – a number of privatised road entities or their parent holding companies are listed on the Kuala Lumpur Stock Exchange;
- ii) earlier implementation and completion of viable highway projects;
- iii) cost saving innovations in construction techniques;
- iv) users enjoy an improved standard of service and greater accessibility;
- v) the creation of more and better job opportunities; and
- vi) the development of various areas of expertise in the local highway industry.

Toll highway projects have also created a spin-off effect on the economy by promoting greater economic activities. There was a prominent increase in the number of personnel employed and companies involved in services rendered to the highway sector as shown previously. Services rendered include areas in consultancy such as engineering, architectural and quantity surveying. However, the sector has also promoted the flourishing of other related industries and services such as insurance, banking, food, material supplies, hospitality, tourism and the local automobile industry. For the highway sector, the jobs created amounted to 7,704 numbers during construction and the highway industry currently employs over 5,000 personnel in its activities. Table 6 shows the major development areas that had taken place as a result of the development of the toll highways network, whilst Tables 7 and 8 show the major industrial and township areas that had taken place along the North-South Expressway, which formed the spine of the highway network in Malaysia.

Table 6
Major Development Areas Along Toll Highways

Highways	No. of Projects
North South Expressway	20
ELITE Expressway	5
Shah Alam Expressway	13
Kuala Lumpur-Karak Highway	10
Damansara-Puchong Highway	24
Penang Bridge	10
Malaysia-Singapore Second Crossing Highway	6
Sungai Besi Highway	3
Cheras-Kajang Highway	5
Total	96

Table 7
Major Industrial Areas Along The North-South Expressway

Company	Size (ha)	Project
Perodua	80	Second National Car
Batanah Sdn. Bhd.	24	Auto Industrial Park
Kundang Properties	160	Kundang Industrial Park
Brem Holdings	223	Sg. Petani Industrial Park
Kedah Sedc	1450	Kulim Hitech Park
AMDB Group	260	Nilai Industrial Park
Perwaja Steel	NA	Steel Billets
Time Telekom	NA	Fibre Optics

Table 8
Major Township Areas Along The North-South Expressway

Company	Size (ha)	Project	Est. Value (RM)
Asiatic Dev. Bhd.	2,788	New Township	3 billion
Country Heights	157	Luxurious Country Living	180 million
Sg. Kantan Dev. Sdn. Bhd	240	Saujana Impian Township	430 million
Bangi Heights	340	New Township (12 years)	1 billion
Seremban 2/Land & General	920	New Township (8 year)	1 billion
Lion Group	1,942	Mixed Commercial Dev	250 million
Peladang Kimia Bhd.	1,465	Bandar Baru Nilai	2 billion
Vintage Height Sdn. Bhd.	2,920	New Township (20 years)	3 billion
FACB Bhd.	552	Bukit Unggul Golf & Country Resort	500 million
Bedford Bhd.	320ha	Bukit Rahman Putra	800 million
Larut Holdings	2200ha	Bukit Beruntung	1 billion

The highway network has provided increased accessibility to areas that previously did not have this access. As a result township projects and industrial areas are developing in areas that are further away from the circumference of developed areas. New major industrial areas amounting to a few hundred hectares each are common along the highway corridors. For example, there are close to a dozen major township areas that had developed along the North-South Expressway, each comprising a few hundred hectares with an estimated total development value of RM 13.2 billion.

9. Contributing Success Factors in Toll Highway Development

The government's promotion and growth of the toll highway network have come about with a conducive environment for its healthy development. The presence of a well-developed private sector that has actively participated in the privatisation programme, strongly supported by a flourishing and established financial and capital market, has been contributing vital elements in the success of the programme. Other contributing factors can be summarized as follows.

Government Commitment: The Government's strong commitment in ensuring the success of the highway programme within the privatisation policy has seen it introducing changes in various sectors like public administration, legal amendments to laws and willingness to transfer its business to the private sector.

Ideal Investment Atmosphere: The present Government has been in power since the country achieved independence in 1957, providing the political stability and consistency in government policies and economic activities.

Government Support: The privatisation policy that included the toll highway programme was implemented within the larger context of the National Development Policy. It is supported by other Government policies such as labour policy, capital market policy and fiscal policy. Tax encouragement and concessions were given to enable the private sector to initiate viable projects. The government has even gone to the extent of amending the various laws to facilitate the privatisation of its agencies. Since highway projects have a long gestation period, and to make the project commercially viable, the Government has to bear part of the social cost by providing concessions or incentives according to need basis of the individual project. Government supports in the form of soft loans, a minimum level of traffic volume guarantee, adverse foreign exchange guarantee for off-shore loans and the provision of land for the highway project had been given based on the characteristic of each individual project after careful and detailed technical and financial evaluation and subsequent negotiations with the consortium chosen for the project.

Clear Policies and Guidelines: The government has set clear and distinct principles and guidelines in its endeavour to make the private sector participate in a big way in the national economy. In the process, the government has taken action to coordinate and streamline the mechanism and procedures of administering privatisation of the various projects. Services and government agencies that are suitable for privatisation were identified to enable interested parties to evaluate and forward their proposals. To enable a speedy conclusion to the agreement for the privatised project, guidelines on the roles and functions were determined for the various ministries and agencies involved.

The Existence of a Healthy Capital Market: The existence of a healthy capital market in Malaysia has enabled it to meet the huge demand for its resources. The availability of funds from various sources ranging from financial institutions to trust funds and insurances have provided the private sector with a recourse to borrowing to fund its projects. Recently, borrowings have been made attractive by the low interest rate regime existing in the country.

Large Pool of Capable Contractors and Investors: The economic development achieved by the country in the late 1980s and early 1990s has created a large pool of capable local contractors willing to take on the challenges of playing a bigger role in the economy. They have formed consortiums to tender for privatised highway projects both as contractors and investors. Acting as a group has enabled them to provide the necessary credibility, both technically and financially, to undertake big projects both locally and overseas.

Large Pool of Technical Expertise: The education system, and the works involved in the carrying-out of the projects, has successfully produced a large pool of technical personnel capable of implementing mammoth and technically challenging projects. Consulting firms have grown in stature and provided a wide range of services to ensure the successful implementation of highway projects.

Public Acceptability: Toll collection is the main source of revenue besides revenue derived from ancillary facilities for a highway concession company. The toll structures as proposed by the concessionaires should therefore be of a level acceptable and affordable to the motoring public.

Assistance From Government Agencies: The government continues to provide assistance in various forms to the concession companies through various stages of the highway projects. In this sense, the Malaysia Highway Authority acts as a one-stop agency whereby it helps solve problems encountered by the concession companies in its projects and at the same time liaise with other government agencies to ensure the smooth implementation of the projects. These assistance and support are necessary to see the concession companies through the various stages of design approval, construction and maintenance.

10. Conclusions

Malaysia has achieved a high degree of success in toll highway development that was largely undertaken and financed by the private sector. The private sector's initiative and innovations are among the main factors contributing to the accelerated implementation of highway projects in Malaysia and it has also contributed to the development of other related industries in the country. Malaysia's recent healthy economic growth rates can be attributed to the major role contributed by the success of the privatisation programme including the privatisation of toll highway projects. A good infrastructure is a prerequisite for economic development and the highway network traditionally formed the backbone of the transportation system for a nation. Malaysia has embarked on a vigorous highway implementation programme as a strategy in national development and the sector will continue to provide a catalyst for sustaining an increasing rate of economic growth. Most regional countries including Indonesia, Thailand, Philippines, China and India have carried out the strategy of implementing toll highway projects by the private sector.

The experience gained by the local contractors in highway construction has enabled Malaysian construction companies to venture abroad and undertake highway projects in countries such as the Philippines, India, Cambodia, Bosnia Herzegovina, China and Vietnam among others. The prosperity that is presently enjoyed by the country would not have been possible without the foresight and concrete steps taken to invest in infrastructure project including road and highway projects. Indeed the combined efforts of the public and the private sectors have brought the country nearer to its stated vision of achieving a developed nation status by the year 2020, by promoting a high and continued economic growth rate.

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Challenges and Opportunities for Road Development in Indonesia

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Settlement and Regional Infrastructure, Indonesia

1. Introduction

Indonesia is a vast archipelagic country covering thousand of islands over enormous distances and contains a population of over 200 million people. It is currently the fourth largest country in the world. The transport problems faced by Indonesia are, therefore, unique, numerous, multi-various and demanding. The transport sector has changed and improved over the past 25 years but more needs to be done to meet the needs of the future. The recent new laws on autonomy and fiscal equalization will change the way the transport sector develops in the future.

The Directorate General of Regional Infrastructure, as an Institutional responsible for road development in Indonesia, should anticipate those problems with a unique and even specific way in order to provide an efficient and effective road infrastructure services.

This paper describes the condition of the road authority in Indonesia, including the organizational framework, road network, its challenges and opportunities in toll road development.

2. Organization Framework

Initially there was a single road authority but more recently this has been split into several institutions. Since the issuance of Law No 13 (Year 1980), roads have been the responsibility of the Directorate General of Highways (currently Directorate General of Regional Infrastructure under the Ministry of Settlement and Regional Infrastructure) with national, provincial, district and urban roads managed by the central government, provincial government, district and city government respectively.

In 2000, the institution was split into the Ministry of Regional Development and the State Ministry of Public Works, which led to a confusing responsibility in road development between those institutions. In 2001, these Institutions merged under the Ministry of Settlement and Regional Infrastructure, with roads being managed by the Directorate General of Regional Infrastructure.

Currently, the key organizations involved in the road transport sector are the Directorate General of Regional Infrastructure (DGRI) of the Ministry of Settlement and Regional Infrastructure, and the Directorate General of Land Transportation (DGLT) of the Ministry of Communication and Telecommunication. The DGRI is responsible for the road network while the DGLT is responsible for regulating road traffic and transport, including inland waterway transport.

The overall planning, programming and development of the national road network is delegated to the Ministry of Settlement and Regional Infrastructure (MSRI) by Law No. 13/1980 and by Government Regulation No. 26/1985. The Directorate General of Regional Infrastructure of this Ministry is responsible for the provision and maintenance of the national road infrastructure. For provincial and local roads, road management and policy is delegated to the respective regional and local governments, with DGRI setting the National Guidance and technical standards for maintenance and development.

The organization structure of the Directorate General of Regional Infrastructure is shown in Figure 1.

3. Description of Road Network

Road Law (Law No. 13 Year 1980) is the basic law of road administration. Its aim is to improve the road network and supporting area development in order to provide an equal distribution of service. It sets forth a wide range of articles and guidelines related to roads such as designation and approval of routes, road administration, and toll road development.

The road law classifies and defines road into four categories: national roads, provincial roads, kabupaten roads and urban roads. These categories reflect also the institutions responsible for road development, i.e. central government for national roads, and provincial, kabupaten and city government for provincial, kabupaten and urban road respectively.

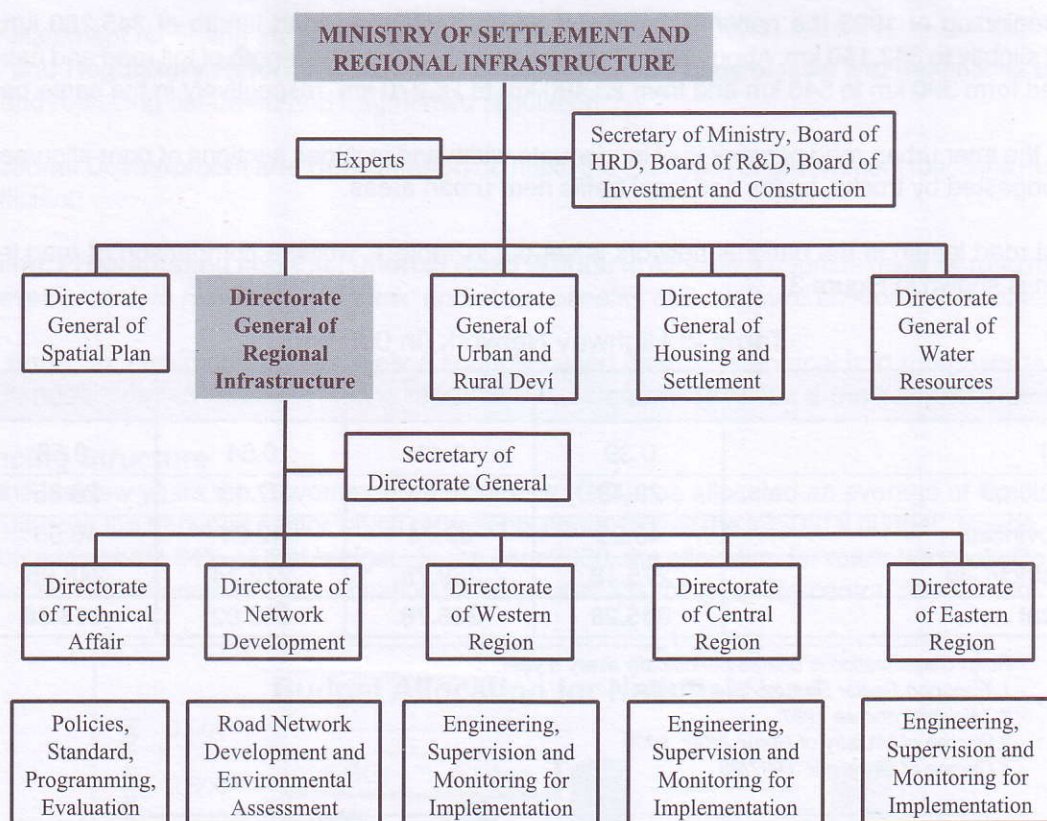


Figure 1: Organization Structure of Directorate General of Regional Infrastructure

Besides these categories, the Law also defines roads based on their connection to cities or activity centers into the primary and secondary road network. This is further divided into arterial, collector and local road based on the traffic characteristics. The road classification system is shown in Figure 2.

Network System	Classification		Responsible Insitution	
	Functional	Administrative		
Primary Road Network System	Primary Arterial		National Road	Central Government
	Primary Colector Road	KP1		
		KP2	Provincial Road	Provincial Government
		KP3		
		KP4	District Road	District Government
	Primary Local Road			
Secondary Road Network System	Secondary Arterial Road		City and District Road	City/District Government
	Secondary Colector Road			
	Secondary Local Road			

Note: - A Toll road is defined as a primary arterial road which is responsibility of central government.

- Based on Law No. 13 Year 1980 and Government Regulation No. 26 Year 1985 Regarding Road.

Figure 2: Road Classification System

At the beginning of 1993 the national, provincial and district/urban road length of 345,280 km. In 1997 reduced slightly to 342,140 km. About 50% of which was asphalted. The length of toll road and national road increased from 390 km to 546 km and from 23,480 km to 26,270 km, respectively in the same period.

Much of the inter urban road network is of inadequate width and includes sections of poor alignment, and is badly congested by trucks, buses and local traffic near urban areas.

The total road length in the national network is set out in Table 1, whilst a comparison of road length and condition is shown in Figure 3.

Table 2: Highway Network (in 000 km)

Administrative Status	1993 ¹	1996 ¹	1997 ¹	2000
Toll	0.39	0.41	0.54	0.58
National	23.48	26.85	27.13	26.85 ²
Provincial	46.23	39.74	42.21	46.50 ³
District/City	275.18	269.78	272.14	248.95 ⁴
Total	345.28	336.78	342.02	318.88

Note: - Road Classification is updated periodically every 5 year

- 1 Transport Sector Strategy Study, 1997

- 2 Ministerial decree 1997

- 3 Decree of Ministry of Home Affairs, 2000

- 4 Decree of Governor, 1997/98

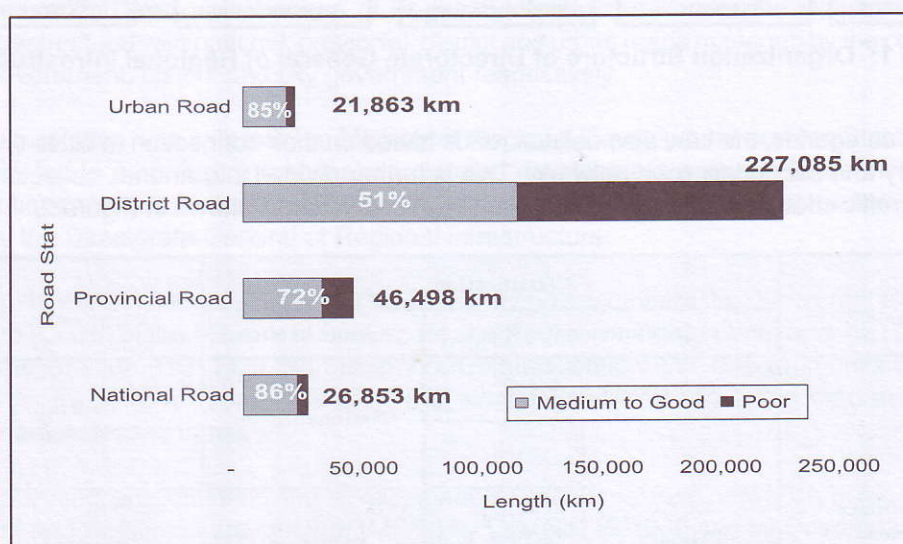


Figure 3: Road Length by Condition and its Function

4. Development Plan and Strategies

The policy for the road network outlined in the National Spatial Development Plan is to implement road network development and management based on an agreed spatial development plan. Road network planning policy is oriented towards the support of strategic development sectors and achieving public welfare. The strategic development sectors to be supported by Directorate General of Regional Infrastructure are:

- ☐ transportation, spatial and land use planning, regional development, urban and rural development and transmigration;
- ☐ agriculture, forestry and plantations and mining;
- ☐ industry, trade and tourism;
- ☐ equity development, poverty alleviation, business development, cooperatives and human resources; and
- ☐ environment.

Policy statement regarding the road infrastructure are as follows:

Legal and Regulatory Reform: to introduce a comprehensive body of laws and regulations covering the road, and replacing out-dated and fragmented regulation.

Institutional Development and Coordination: to make the execution of government functions more effective and efficient.

Planning, Programming and Execution of Road Works: to allocate resources used for road maintenance and development, to maximize economic and social benefits and minimize environmental damage.

Road Fund: to implement progressively a soundly based user-pays approach to road user taxation, with particular attention being paid to pricing of fuel and rates of vehicle registration charges.

5. Financing Structure

Over the last few years the Government of Indonesia (GOI) has allocated an average of Rp 6.2 Trillion for expenditure in the transport sector which represents about 15% of the total GOI budget. Roads, on average contributed to about 64% of that budget. In the year 2000, the allocation for roads was only Rp 1.6 Trillion. Figure 4 shows historical budget allocation for national roads managed by central government.

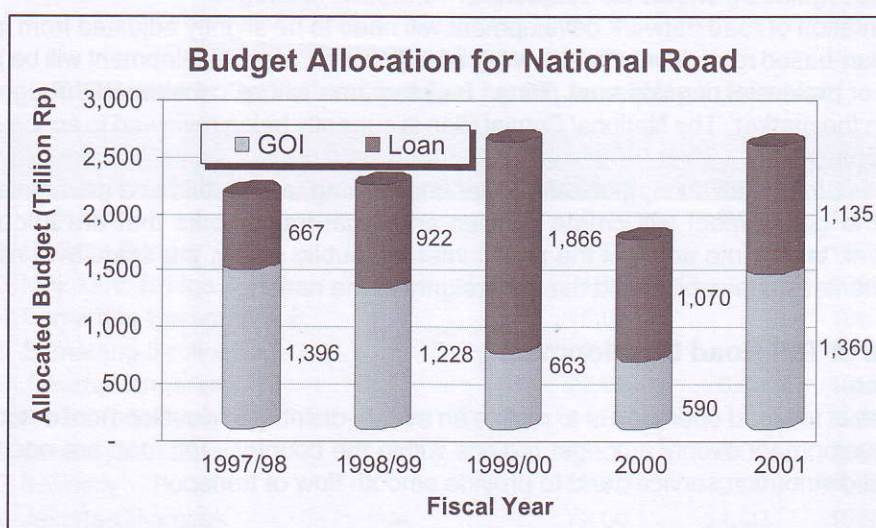


Figure 4: Budget Allocation for National Road

6. Challenges

6.1 Road Funding

In many countries, off-budget Road Funds (RFs) financed from user charges have been effective in solving the problems of road maintenance funding and management. In response with the difficulties associated with government funding, the road fund is considered as an alternative. After reviewing alternative maintenance funding mechanisms at the national and district (kabupaten/kota) levels, the Road Fund Study recommended that a system of provincial road funds (PRFs) be adopted which would fund the rehabilitation and maintenance of national and provincial roads in each province and also transfer funds to urban settlements and district administrations.

The revenues of the PRFs would be derived from road transport fuel tax (PBBKB) and the annual vehicle registration tax (PKB) receipts, which together would constitute the Road User Charge and Road Damage Charge respectively.

The new road law includes road user participation on road especially for maintenance. It regulates the duties and responsibilities of society on road development, the responsibilities of road authority to society, and the road fund and independent road board for road fund management.

The scheme is still being implemented after legal aspect and socialization issues are resolved.

6.2 Other Issues

In the future, there are many other challenges and opportunities faced by the Institution is to be an efficient and effective road organization in Indonesia. Examples include the following:

- ❑ A short of government funding will demand the best possible use of available budget as well as the efficient use of other sources of funding.
- ❑ Indonesia is composed of 33 provinces and about 500 cities and regencies which are located in many islands and characterized by different level of development. Specific and unique approaches are required for the management of the roads in these different locations.
- ❑ Since 1999, Indonesia has commenced a policy of decentralization through the enactment of Law No. 22 Year 1999 (Local Autonomy) and Law No. 25 Year 1999 (Balance of Budget). This will lead to streamlining of the central government and increase the role of the regional and local government.
- ❑ Democratization in the road sector will lead to a decline in the role of the public sector, an increase in the role of the private sector and the emergence of the third sector.
- ❑ As a result of globalization and liberalization, road and transport infrastructure will no longer obey administrative and political boundaries, in the borderless world; transport infrastructure networks and services are integral parts of global and regional networks.
- ❑ Road network should be integrated with international road network systems such as ASEAN and Asian highways systems. This also reflects the fact that international standard, both in design criteria and traffic regulation, should be adopted.
- ❑ The orientation of road network development will need to be slightly adjusted from island oriented to spatial plan-based road development. With this approach, road development will be based on agreed national or provincial development plans. Isolated area will be considered through the provision of access to the market. The National Spatial Plan is currently being reviewed to accommodate changes in autonomy.
- ❑ In response to privatization, global financial engineering, and public and private sector partnership issues, the government will create policies and legal frameworks that are conducive to private investment, taking into account the public interest, public safety, the scarcity of natural resources, environmental sustainability and the sovereignty of the nation.

7. Opportunities in Toll Road Development

7.1 Introduction

The purpose of toll road operation is to realize an evenly-distributed development outcome as well as to balance development evenly amongst regions within the country. Toll road are operated to increase efficiency of distribution services and to provide smooth flow of transport.

Toll roads are particularly implemented in developed areas where the traffic volume is relatively high and the funding is "derived" from time and vehicle operating cost savings associated with the use of the toll road. With this arrangement, Government funding can be concentrated on developing the road network in less-developed areas.

Presently, toll road projects can be group into four categories: toll roads in operation (20 links), toll roads under construction (3 links), toll roads which has not been constructed (8 links with authorization agreement) and 12 links without authorization agreement. There are also 11 links proposed by local government (see Figure 5).

7.2 History of the Toll Road Project

The first toll road in Indonesia was opened in 1978. This road was built by the Government mainly using G to G loan, PT Jasa Marga (Persero), a State Owned Company, was then established to manage and operate this Toll Road. Consecutively other Toll Roads were built by the Government and PT. Jasa Marga (Persero) with fund sources from G to G and Jasa Marga's bonds.

In 1987 the Government of Indonesia adopted a policy to encourage private sector participation in infrastructure development, including Toll Roads. Since then private investments were the main driving force of Toll Road development in Indonesia and private participation increased drastically. Presently, some 515 km of Toll Roads are operated in Indonesia, 345 km by Jasa Marga and 161 km by private investor (see Table 1 and Table 2).

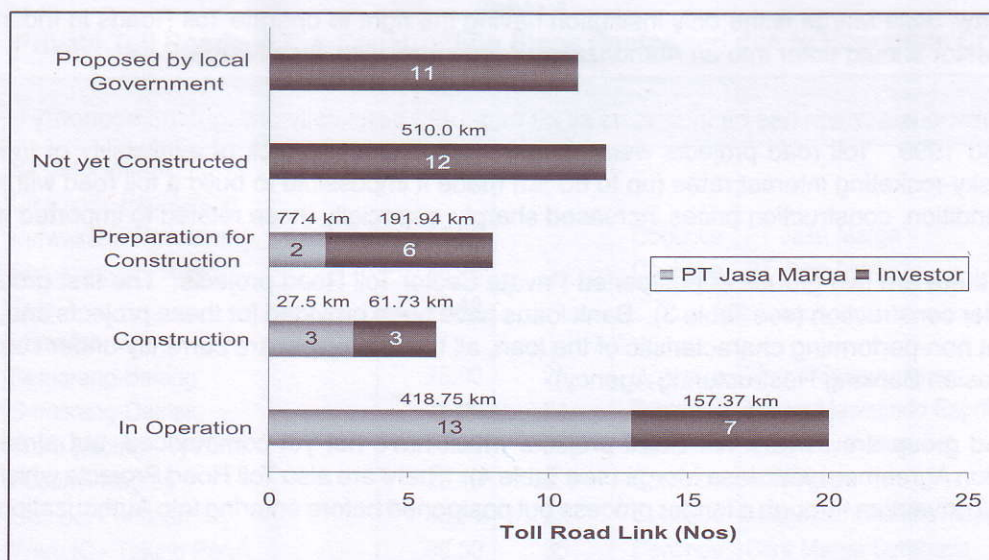


Figure 5: Status of Toll Road Project

Table 1
Toll Roads in Operation Managed by PT Jasa Marga (Persero)

No.	Road Link	Length (km)		Operation
		Main Road	Access	
1	Jagorawi	50.00	9.00	1978
2	Citarum Bridge	0.91		1979
3	Mojokerto Bridge	1.25		1982
4	Semarang Section A & B	15.00		1983
5	Semarang Section C	9.75		1997
6	Jakarta-Tangerang	27.00	6.00	1984
7	Prof. DR Sedyatmo	14.30		1985
8	Surabaya Gempol	43.00	6.00	1986
9	Balmera	33.70	9.00	1986
10	Jakarta-Cikampek	72.00	11.00	1988
11	Cawang-Tomang	16.00		1989
12	Tomang-Grogol-Pluit	7.55		1996
13	Padalarang-Cileunyi	35.63	28.77	1991
14	Cirebon-Palimanan (Plumbon-Kanci)	20.30		1998
15	Ulujami-Pondok Aren (Pd Aren-Bintaro)	2.55		2001
Total		348.94	69.77	
Grand Total		418.71		

Table 2
Toll Roads in Operation Managed by Investors

No.	Road Link	Length (km)		Operation	Company
		Main Road	Access		
1	Ir. Wiyoto Wiyono	15.50	1994	2023	CMNP
2	Harbour Road	11.55	1994	2023	CMNP
3	Tangerang-Merak				
	- Tangerang Barat-Ciujung	34.20	1990	2011	Marga Mandala Sakti
	- Ciujung-Tg. Gerem	38.80	1993	2014	
4	Surabaya - Gresik	20.70	1991	2016	Margabumi Matraraya
5	Ujung Pandang tahap I	6.05	1994	2024	Bosowa Marga Nusantara
6	Pondol Aren-Serpong	7.25	1997	2024	Bintaro Serpong Damai
7	JORR W2, S, E1, E2 & E3				
	- JORR Section S (Pd Pinang-TMII)	14.25	2001	2036	PT Jalan Tol Lingkarluar Jakarta
	- JORR Section E2 (Cikunir-Cakung)	9.07			
Total		157.37			

Since, by law, Jasa Marga is the only institution having the right to operate Toll Roads in Indonesia, every private investor should enter into an Authorization Agreement with Jasa Marga.

The economic crisis which has hit Indonesia since mid-1997 practically brought the economy to a stand-still in 1998 and 1999. Toll road projects were postponed because the lack of availability of funding and, if available, sky-rocketing interest rates (up to 60 %!) made it impossible to build a toll road within its budget limits. In addition, construction prices increased sharply, especially those related to imported goods.

Presently, there are two groups of postponed Private Sector Toll Road projects. The first group is the Toll Roads under construction (see Table 3). Bank loans have been provided for these projects and, because of the present non-performing characteristic of the loan, all these projects are currently under control of IBRA (the Indonesian Banking Restructuring Agency).

The second group are Private Toll Road projects which have not yet commenced, but already have an Authorization Agreement with Jasa Marga (see Table 4). There are also Toll Road Projects which have been appointed to investors through a tender process but postponed before entering into Authorization Agreement (Table 5).

By the beginning of 2000, experts and analysts were of the opinion that the economic crisis in Indonesia was bottoming-out and it was hoped that economy would grow by an estimated 3-4 %.

In line with the period of decentralization, there are 11 toll road links proposed by local government in either the provincials or districts more toll road are expected to be proposed in the future. Toll roads proposed by local government are shown in Table 6.

The delay in the development of roads and Toll Roads for almost three years has resulted in high priority now being placed on the completion and continuation of these projects. However, as Indonesia is still struggling to recover its banking sector, foreign investment is very much needed to assist the National economic recovery.

Table 3
Private Toll Road Under Construction Postponed due to Economic Crisis

No.	Road Link	Length (km)	Concession		Company
			Start	Completed	
A	PT Jasa Marga				
1	Cirebon-Palimanan	6.00			
	Palimanan-Plumbon				
2	Pd Aren-Ulujami	3.00			
	Bintaro(V)-Ulujami				
3	Cikampek-Padalarang	12.50			
	- Cikampek Purwakarta				
	- Padalarang Bypass	6.00			
	Total I	27.50			
B	Investor				
1	JORR Section W1 (Penjaringan-Keb Jeruk)	9.76	1997	2027	Jakarta Lingkar Barat Satu Jalan Tol Lingkarluar Jakarta
2	JORR Section W2,S,E1,E2 &E3	11.17	2001	2036	
	- JORR Section W2 (Kb. Jeruk-Pd. Pinang)				
	- JORR Section E1 (TMII-Cikunir)	12.40			
	- JORR Section E3 (Cakung-Cilincing)	6.00			
3	Bekasi Timur-Cawang-Kp Melayu	22.40	1997	2028	Kresna Kusuma Dyandra marga
	Total II	61.73			
	Grand Total	89.23			

Table 4
Private Toll Roads In Pre-Construction Stage Postponed due to Economic Crisis

No.	Road Link	Length (km)	Concession		Company
			Period	Status	
A	PT Jasa Marga				
1	Cikampek-Padalarang	41.00		Continue	PT Jasa Marga
2	Purwakarta-Padalarang	36.40		Continue	PT Jasa Marga
	Surabaya-Mojokerto				
	Total I	77.40			
B	Investor				
1	Semarang-Batang	75.00	28	Continue	Marga Setiapuritama
2	Semarang-Demak	25.00	24	Postpone	Marga Mawatindo Esprit
2	Waru (Aloha) - Tj Perak	18.40	33	Postpone	Margaraya Jawa Tol
	Cileunyi-Nagreg	23.40	22.5	Continue	Adhi Karya
	Gempol-Pandaan	13.64	22	Continue	Margabumi Adhika Raya
	Waru IC - Tajung Perak	36.50	35	Continue	Citra Marga Surabaya
	Total II	191.94			
	Grand Total	269.34			

Table 5
Toll Projects Appointed to Private Investor (No Authorization Agreement)

No.	Road Link	Length (km)	Concession		Company
			Period	Status	
1	Ciawi-Sukabumi	53.50	27.0	Reviewed	Bukaka Teknik Utama
2	Kanci-Pejagan	34.00	21.0	Postpone	Bakri Investindo
3	Pejagan-Pemalang	56.00	25.0	Postpone	Mitrajaya Artha Marga
4	Pemalang-Batang	35.00	21.0	Reviewed	Submer Mitra Jaya
5	Semarang-Solo	80.00	34.0	Postpone	Karya Semesta Indah
6	Kertosono-Mojokerto	38.00	22.3	Postpone	Hanurata Coy. Ltd
7	Pandaan-Malang	29.50	24.0	Reviewed	Sedtco Graha Nusantara
8	Pasuruan-Probolinggo	40.00	28.0	Reviewed	Bukaka Teknik Utama
9	Sadang-Subang	37.00	21.8	Postpone	Harmoni Marga Jaya
10	Subang-Dawuan	52.50	22.0	Postpone	Lintas Marga Karya
11	Dawuan-Palimanan	24.50	21.5	Postpone	Dawuan Plmn Marga Sakti
12	Ciranjang-Padalarang	30.00	20.8	Postpone	Bina Puri Holding Bhd.
	Total	510.00			

Table 6
Toll Roads Proposed by Local Governments

No.	Road Link	Length (km)	Concession		Company
			Period	Status	
1	Cikarang-Tanjung Periuk				Kab. Bekasi
2	Soreang Pasir Koja				Kab. Bandung
3	Cileunyi-Sumedang-Dawuan				Kab. Sumedang
4	Gempol Pasuruan				Kab. Pasuruan
5	Medan - Kualanamu				Prop. Sumatera Utara
6	Medang - Tebing Tinggi				Prop. Sumatera Utara
7	Medan Binjai				Prop. Sumatera Utara
8	Palembang Indralaya				Kab. Ogan Komering Ulu
9	Palembang-Tanjung api api				Kab. Ogan Komering Ulu
10	Padang - Pekanbaru				Prop. Sumatera Barat
11	Pakanbaru-Dumai				Pro. Riau

7.3 Possible Investment Opportunities in Toll Roads

- A. Strategic partnering with existing investors, either for projects under construction, at the pre-construction stage, or projects which have been appointed to investors (via the tender process) but were postponed after the appointment of investors. These investors have not yet entered into an Authorization Agreement with Jasa Marga. It should be noted that, because of changes to almost all of the investment parameters, the feasibility of each and every project should be carefully reviewed.
- B. If, because of the non-performance loans, the government decides to take over the projects currently under IBRA and offers them to new investors, then there will be a chance to propose new investment schemes, either by new investors or in cooperation with Jasa Marga.
- C. Investing in new Toll roads: Toll Roads to be offered to new investors will be decided by the National Development Planning Board (Bappenas) after a total review of National Road Master Plan and pre-feasibility study by the Government.

7.4 Basic Concept of Toll Road Investment

The basic concept of toll road investment in Indonesia is as follows:

- a) A toll road should be a "self financed" and "non-recourse" project.
- b) By law, Jasa Marga is the one and only State-owned Company which has the right to manage and operate toll roads; hence Investors should enter into an Authorization Agreement with Jasa Marga.
- c) The investment scheme is Build, Operate and Transfer (BOT), where the investor will be granted a certain concession period (25-35 years). During this period a revenue sharing scheme should be adopted.
- d) The toll road, and the land on which it is built, is the property of the Government.
- e) The initial tariff will be calculated and agreed during investment negotiations and established by Presidential Decree. A Tariff Adjustment Formula is presently being prepared for adoption by Government Regulation.
- f) Land acquisition should be conducted by the Government, but since the Government budget is limited, funding should be done by the investor. It will be calculated as part of the investment cost.
- g) The selection of investors will be carried out based on a transparent and competitive procedure according to Presidential Decree No. 7/1998.

Initiatives in the Road Sector in India

Deepak Dasgupta

National Highway Authority of India

1. Indian Road Network

The Indian road network totals 3.3 million km in length (see Table 1). It is composed of three major components: primary, secondary and tertiary. Primary roads include National Highways and are the responsibility of the Indian Government. Secondary roads include State Highways and major district roads and are the responsibility of Provincial Government, whilst tertiary (or rural) roads – which form by far the bulk of the network – are the responsibility of Provincial Government and local authorities.

Table 1
Details of the Indian Road Network

Road Organisation	Road Type	Length (km)
Primary (National Government)	National Highways	58,112
Secondary (Provincial Governments)	State highways major district roads	137,119 470,000
Tertiary (Provincial Govt and Local Authorities)	rural roads	2,650,000

Roads carry 85% of all passenger traffic and 70% of all freight traffic. Only 2-3% of the primary road network is of 4-lane construction, whilst 15% is of single-lane construction. Both the primary and secondary networks have severe problems with capacity and a lack of mobility. A major issue with tertiary roads is "connectivity": 40% of the population of India does not have access by all-weather roads.

2. Recent Strategic Initiatives

In order to underpin the need for national road development, a scheme called Road Cess was instigated which involves the collection of levies on petrol and diesel fuel. The levies on petrol and diesel commenced in 1998 and 1999 respectively. During 2001-2002, an estimated US\$1250M will be collected made up of \$500M (rural roads), \$438M (National highways), and \$228M (district roads). Another \$84M will be collected from rail use. This income is supplemented by the provision of budgetary funding, private funding and toll revenues.

The private sector has been invited to participate in the scheme by being allowed to collect and retain tolls, the provision of capital grants of up to 40% for BOT (build, operate, transfer) projects and model concession agreements.

2.1 National Highways Development Project

The National Highways development Project is India's largest ever highways project. It aims to provide superior roads having uninterrupted flow, including 4- to 6-lane highways of a total length of 14,000 km. The projected cost of the project is US\$12.08B. There are three basic components of the system:

- ❑ Golden Quadrilateral: 5,846 km of high density corridors linking Delhi, Mumbai, Chennai and Kolkata. Its estimated completion date is December 2003.
- ❑ North-South (NS) and East-West (EW) corridors: the NS corridor (4,000 km long) will link Kashmir and Kanya Kumari whilst the EW corridor (3,300 km log) will link Silchar and Saurashtra (Porbandar). It is due for completion in December 2007.
- ❑ A further 1000 kms of links between ports and other roads is also included.

The finance for the NHDP is being provided as follows:

- | | |
|---|-----------|
| ❑ Cess | US\$4.16B |
| ❑ World Bank/Asian Development Bank loan/other assistance | US\$4.16 |
| ❑ market borrowings: | US\$2.5 |
| ❑ private sector: | US\$1.26B |

2.2 Reforms in the Road Sector

The three basic ingredients are: credible funding arrangements, institutional reforms and decision-making processes.

Funding arrangements can include credible means of funding using general charges such as Cess and specific charges such as tolls. This enables private sector participation, access to multilateral funds, more competitive bidding and a constant value addition for tolls.

Institutional reform is generally understood to involve the following five stages.

Stage I	Department:	does almost everything, that is, in effect, is the client, the contractor and the engineer
Stage II	Department:	in this stage the Department outsources the provision of labour to the contractor but retains the client, the engineer and the supplier of equipment functions
Stage III	Department:	here the Department retains just the client and the engineer functions with the contractor providing the equipment, materials and labour
Stage IV	Department:	retains only the client function
	Consultant:	project preparation and construction supervision
	Contractor:	construction (equipment, materials and labour)
Stage V	Department:	only the client
		All procurement including operation and maintenance with private sector (under BOT/Annuity schemes)

Previously, capacity to implement reform was restricted by a lack of departmental strength. Outsourcing increases capacity and enables access to specialised agencies not previously available to the Department.

Current Departmental responsibility includes:

- ☐ the procurement of resources;
- ☐ ensuring checks and balances and making them inherent in the procurement process; and
- ☐ dealing with other agencies (such as State Governments) to facilitate implementation.

The system will operate under contractual agreements, i.e. it will be company/market based rather than orientated to the individual Government officer. The Department will be responsible for the overall results.

The decision-making process will involve program approval at the Government level. Approval for individual projects will lie with entities such as the National Highway Authority of India (NHAI) and operational autonomy will be entrusted to organisations such as the NHAI. Functional decisions at the project level will be made through contractual arrangements.

There are many challenges in reforms of this magnitude, particularly in the implementation of contract and quality control processes to achieve the desired outcomes. Managing not only the risks but the government and public perception of risks is crucial. It requires detailed attention at every stage :

- project planning, formulation and development
- construction supervision
- contractual developments and the financial planning expertise needed
- contract management

We are not yet at the end point but we have commenced the journey.

Development of the Cambodia Road Network

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1. Introduction

Cambodia is emerging from more than 20 years of war. During this period most of the country's basic infrastructure was badly damaged or destroyed, and much of population processing management, planning, technical skills are lost. Within the road network, the damage has been particularly severe.

After the civil war, Cambodia is strong efforts are being made to rebuild and the redevelop the socio-economy of the country. Sustaining economic growth through improved efficiency of agriculture, industry and service sectors is constrained by an inadequate internal road network and poor links to regional trading partners. The road is critical to Cambodia's economy because of its growing regional trade and agriculture and rural development priorities. A more efficient road infrastructure is essential to facilitate the expansion of small and medium-sized export oriented enterprises.

Cambodia's geographic location offers strategic opportunities for it to become a regional road and trading hub within the dynamic Greater Mekong sub-region as well as a suitable location for regional institutions and administrative services. Improvements in the efficiency of road services will in turn create the conditions for investment in new sector infrastructure. Rapid rehabilitation of road capacity, particularly the re-establishment of the primary road network, is essential, as is the implementation of new services to ensure that future economic growth is not constrained by the absence of an adequate road infrastructure.

In the medium term the Government will build on existing reforms and focus on the most pressing constraints to the rapid development of the sector. The priority will be to improve the efficiency of use of existing infrastructure and accelerate the sector capital program, while enhancing sector planning and financing mechanisms. The Government has an important role to play in increasing the efficiency of the sector by promoting greater private sector participation and facilitating competitive markets for road services. Public investment priorities will complement high priority policy actions aimed at strengthening sector institutional capacity and management, expanding particularly roads, developing cost recovery mechanisms and in support of reforms to be taken at the macroeconomic level.

The first priority in developing the transportation network is the re-establishment of the road network. The poor-quality, damaged, damaged Cambodian road network has been gradually rehabilitated and reconstructed with the technical assistance of international agencies and donor countries.

2. The Ministry of Public Works and Transport

2.1 Organization and Responsibility of MPWT

The Ministry of Public Works and Transport (MPWT) is responsible, on behalf of the Royal Government of Cambodia, for all transport infrastructure in the country, including roads, railways, airports, ports and inland waterways. Through different Departments and enterprises, the Ministry is also responsible for the operations of, for example, the National Railways, the River Transport Company, and the international ports of Sihanoukville and Phnom Penh. The total staff of the MPWT is about 4,000 at the central level, plus some 2,400 in the different provincial departments and around 3,000 at the National Railways and other separate Department and enterprises.

With the support of international donor and lending agencies, this situation is now changing rapidly. The rehabilitation of the road network has already started and is expected to include more than 4,000 km of roads during the next five years, plus at least 200 bridges. Although contractors will undertake much of this work, MPWT must also significantly increase its own capacity. Some types of work can only be undertaken on forced account, and work undertaken by contractors still has to be prepared and supervised by MPWT. Another, equally important, objective is the development of a sufficient capacity for the carrying-out of road maintenance activities in order that the very large funds that are being invested can be managed in an optimum manner.

Technical assistance is needed in a number of different areas in order for MPWT to be able to meet

these objectives. The training of supervisors and surveyors has been identified as one such priority area, because – together with equipment operators and mechanics, for which training facilities are expected to be develop under another project – supervisors and surveyors constitute the core of any construction and maintenance unit.

The organizational chart of the Ministry of Public Works And Transport is shown in Figure 1.

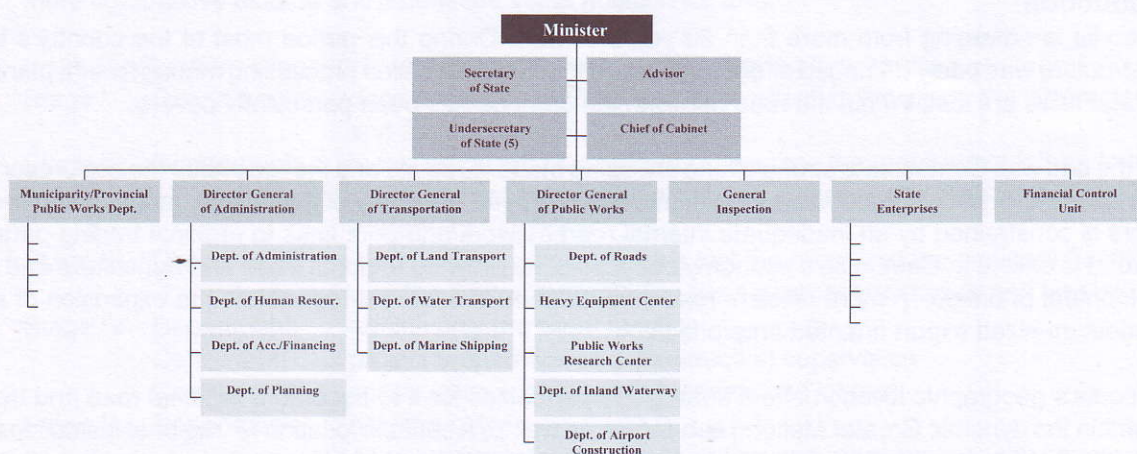


Figure 1: Organization Chart of Ministry of Public Works And Transport

2.2 Enterprise and the Private Sector

Whilst the amount of private investment in the road transport have been somewhat less than impressive to date, the current condition of the road network does not exactly encourage the use of new vehicles. The tariffs charged appear to be reasonable, however, and there is sufficient capacity to meet the present demand, at least regarding goods transport. There are also a large number of small, owner-operated passenger transport vehicles, although they are usually overloaded and not very adequate for this purpose. Regular buses are very few and generally date from the enterprise era.

The development of private contractors who have the competence and equipment to carry out infrastructure construction has barely commenced. Some foreign firms have established local offices, and/or joint ventures with local companies, but they are still waiting for a break and are shunning any major investments in the meantime. A firm commitment by the MPWT to support private entrepreneurs, and preferably also a long term program with foreign funding, is likely to be needed before there will be any further developments in this sector. Once such a program is announced and tenders invited, then the investments could come very quickly as evidenced by the experience from other sectors.

The Government's policy regarding the future of these "enterprises", and many units under other Ministries, is still wide open. One concern is obviously for the existing staff, many or most of whom would probably become unemployed if the units were privatized. On the other hand, the Government is also inviting private sector financing and management for several new projects. The issue is important, but it will take some time before a model suitable for Cambodia is found.

3. Cambodia's Road Network

3.1 Current Situation

The Cambodian road network is shown in Figure 2 whilst links to other countries are shown in Figure 3.

The Government – with the assistance of ADB, UNDP, the World Bank, USAID, Japan, the EU other bilateral agencies and several NGOs – has been focusing developmental efforts on rehabilitating the primary road network, including bridges and ferry crossings in order to facilitate goods transport and the integration of markets. Significant projects in this category have included the reconstruction of a bridge across the Tonle Sap at Phnom Penh, the upgrading of the first section of NR6 and NR7 and the construction of the Mekong Bridge at Kampong Cham, the reconstruction of NR4 to Sihanoukville, as well as the rehabilitation of long sections of NR 1,2,3,5 and 11. The Government also tried, with its own limited budget, to repair and rehabilitation some primary and secondary roads which are links to isolated areas, included NR56, 58,59,67, 69a, etc. Several rural roads have been initiated with the purpose of

promoting socio-economic development in rural areas.

A total 350 km of road has been reconstructed to international standards while another 550 km has been rehabilitated. It is still inadequate, however, given the total length of the national road network 4,615 km plus some 3,165 km of provincial roads.

Road transport is the only mode which has nation-wide coverage: it carries about 90% of the freight moved within the country (see Table1). Primary routes connecting to neighboring countries such as Vietnam, Laos and Thailand have not yet been rehabilitated. The Government of Cambodia is giving a the priority to the rehabilitation, improvement and connection of the main national roads/corridors and of the transport system generally.

Table: 1 Transport Volume by Mode of Transport (Annual Average, 1995-1999)

Mode of Transport	Million pass. /km per year	Million tone/km per year
Rail	45	41
River (est.)	35	80
Road	146.75	274.00

For domestic traffic, road transport is also dominant, as shown in Table 2. Almost 65% of passenger veh-kilometres per year and 69% of other freight are carried by road. About 15% and 20% of passenger and cargo respectively are carried by boat, whilst the remaining 20% of passengers and 10% of cargo is carried by rail. International seaports at Sihanoukville and Phnom Penh are the key gateways linking Cambodia to regional and international markets' they handled an estimated 1.6 million tons of cargo in 1999. International Airports in Phnom Penh and Siem Reap are also important gateways for growing the passenger traffic.

Table: 2 Trend of Traffic Volume on Road Transport (estimated) 1994-1999

Traffic volume	Unit	1994	1995	1996	1997	1998	1999
Goods	Thousand Tones	1,246	2,116	2,563	2,823	2,685	3,214
	Thousand Tone/km	133,070	214,672	269,164	293,450	284,180	308,158
Passengers	Thousand Persons	599	1,052	1,194	1,534	1,254	1,719
	Thousand Persons/km	62,981	105,133	123,885	162,374	141,144	201,223

3.2 Other Networks

ASEAN Highway in Cambodia

There are three road corridors /sections which are designated as part of the ASEAN High Network (see Table 3):

- ❑ ASEAN Highway 1-AH1: (NR5 and NR1) linking Aranyaprattet/Poipet (Thai/Cambodia border)-Phnom Penh- to Bavet/ Moc Bai (Cambodia/Vietnam Border).
- ❑ ASEAN Highway 11-AH11: (NR7 and NR4) linking VoeunKham (Lao/Cambodia border) – Phnom Penh – Sihanoukville Port.
- ❑ ASEAN Highway 123 –AH123 : (NR48) Hat Lek/Cham Yeam (Thai/Cambodia border) – Sre Ambil.

Regional Highways in Cambodia

The framework of the United Nations on the Economic and the Social Commission for Asia and the PACIFIC (UNESCAP) is:

- ❑ Asian Highway A1: (NR5 and NR1). linking Aranyaprattet/Poipet (Thai/Cambodia border) Phnom Penh-to Bavet/ Moc Bai (Cambodia/Vietnam Border).
- ❑ Asian Highway A11: (NR7 and NR4) linking VoeunKham (Lao/Cambodia border)-Phnom Penh-Sihanoukville Port.

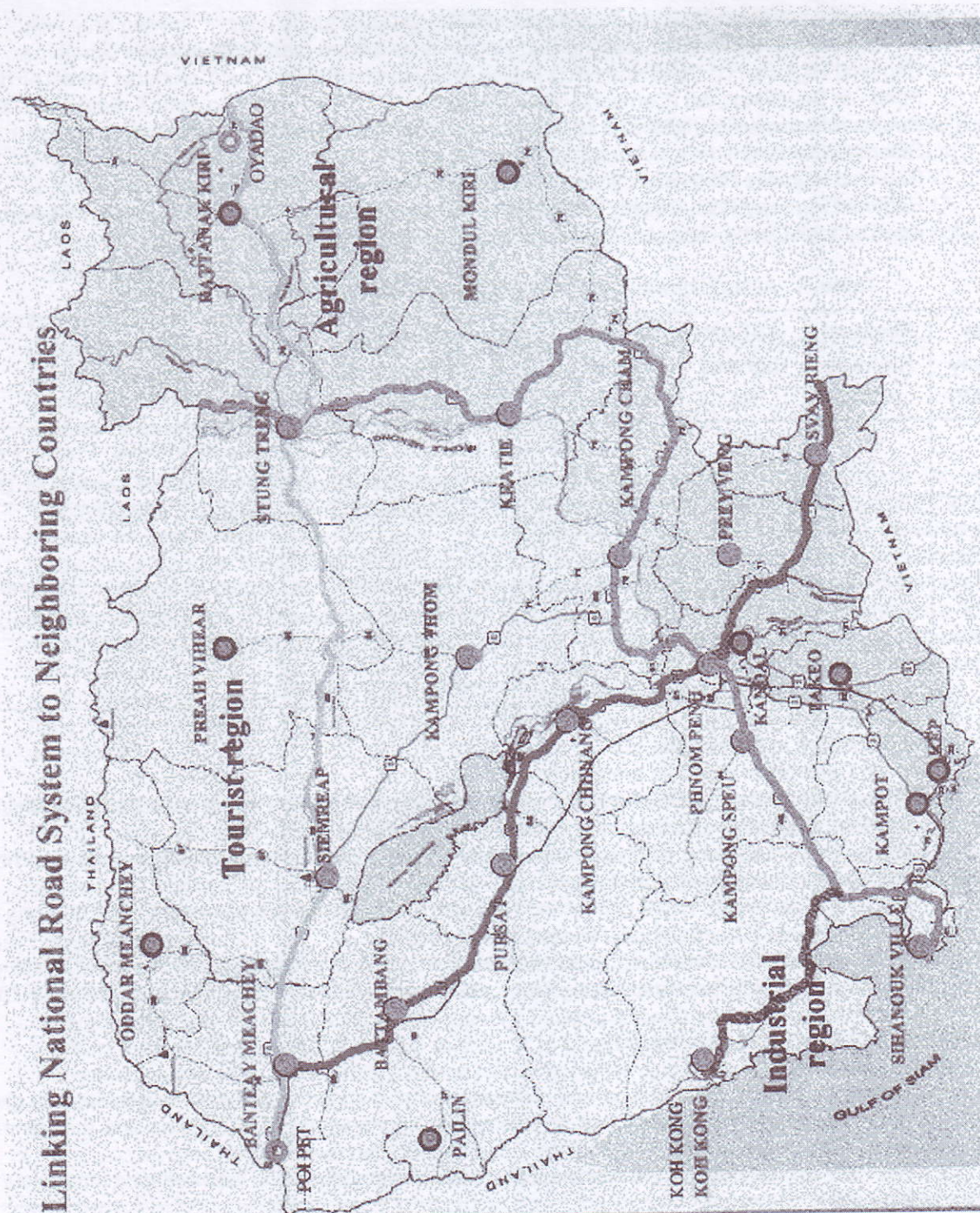


Figure 3: Links between Cambodia's National Road Network and Neighbouring Countries

Table: 3 ASEAN Highway Designation (Cambodia Sections)

ASEAN Highway No	National Roads No	Origin-Destination	Length (km)
AH1	NR5	Thai-Cambodia Border (Aranyaprathet/Poipet) - Phnom Penh	407.45
	NR1	Phnom Penh - Cambodia/Vietnam Border (Bavet/Moc Bai)	167
AH1	NR7 & 6	Lao-Cambodia border (Voenkham/) - Phnom Penh	538
	NR4	Phnom Penh-Sihanoukville Port	226
AH123	NR48	Hat Lek/Cham Yeam(Thai-Cambodia Border) - Sre Ambil	168
		Total	1,506

Framework of Greater Mekong Sub-Region (GMS)

The Framework of the Greater Mekong Sub-Region is as follows (see Table 4):

- ☐ Regional Highway R1: (NR5 and NR1) linking Aranyapratet/Poipet (Thai/Cambodia border)-Phnom Penh - to Bavet/Moc Bai (Cambodia/Vietnam Border).
- ☐ Regional Highway R6: (NR7 and NR4) linking VoeunKham (Lao/Cambodia border)-Phnom Penh-Sihanoukville Port.
- ☐ Regional Highway R9: (NR78), linking from O Pong Moan-Banlung-O Yadav.
- ☐ Regional Highway R10: (NR48) Hat Lek/Cham Yeam (Thai/Cambodia border)-Sre Ambill-Kamport-Kep-Damnak Chang Oeur- Lok/Hatieng (Cambodia/ Vietnam border).

Table: 4 Asian Highways and other Regional/ National Corridors in Cambodia

Asian Highway (ESCAP)	Regional Highway (GMS)	ASEAN Highway No	National Roads number	Origin-Destination
A1	R1	AH1	NR5	Thai-Cambodia Border (Aranyapratet/Poipet)-Phnom Penh
			NR1	Phnom Penh - Cambodia/Vietnam Border (Bavet/Moc Bai)
A11	R6	AH11	NR7	Lao-Cambodia border (VoeunKham) - Phnom Penh
			NR4	Phnom Penh-Sihanoukville Port
	R10	AH123	NR48	Hat Lek/Cham Yeam(Thai-Cambodia Border) - Sre Ambil
	R10*		NR3.33	Veal Rinh,-Kamport-Kep-Lok(Cambodia/Vietnamborder)
	R9		NR78	O Pong Moan (Stung Treng) - Banlung-O Yadav (Cambodia/Vietnam border)

Main Corridors in Cambodia

The main Cambodian corridors are as follows:

- ☐ Corridor 1(East-West): NR5 and NR1 connecting Bangkok/Thailand with Ho Chi Minh City/Vietnam via Poipet, Sisophone, Battambang, Phnom Penh and Bavet.
- ☐ Corridor 2 (North-South): NR7 and NR4 connecting of Southern Port to Southern Lao via Phnom Penh, Kratie, Stung Treng and Voeun Kham.
- ☐ Corridor 3 (East-West): NR48 connecting NR4 with Thailand; eastern sea-board via Koh Kong Hat Lek/Cham Yeam (Thai/Cambodia border) and Sre Ambil.
- ☐ Corridor 4 (Northern East-West): various National Roads connecting Bangkok to Port of Qui Nhorn/ Vietnam via Poi Pet, Siemreap, Stung Treng, Banlung, O Yadav (NR66, RP213, 217, 218, NR78).

4. Development Plan and Strategies

4.1 Development Plan

The policy objective of rehabilitation and maintenance road infrastructure is to be achieved by giving first priority to road rehabilitation and an associated improvement in operations and maintenance capability. The three main objectives of the Road Master Plan (see Figure 1) are to:

- ☐ rehabilitate and reconstruct the main national roads, thereby improving land transport throughout the nation;
- ☐ build road links to neighboring countries, thereby opening up some of the more remote areas of the country to international trade and tourism; and
- ☐ develop a sustainable road maintenance program, thereby assuring that investment in road rehabilitation and reconstruction generated sustainable benefits.

4.2 Road Rehabilitation Program

It is proposed to accelerate the rate at which the road network is rehabilitated and made serviceable by adopting a policy of stage construction, by simplifying contracting procedures, and by employing short-life (three-year) rehabilitation (or emergency repair) techniques. In 2001-2002, external assistance for rehabilitation of 1,400 km of road was secured. The short-term target is to emergency repair or rehabilitate a further 4,800 km of road. The *first* priority will be given to the remaining/secondary National Road that connects Phnom Penh to the provincial capitals. The *second* priority will be given to the additional 2,000 km of the National road system that more directly links adjacent provinces and connects to small communities with towns and cities. At the end and for the target of the program, Cambodia will have a

new road network system about 6,000 km long to contribute to the development of the nation and the economic sector.

4.3 Economic Zones or Triangles

The road rehabilitation program will strengthen the linkage between the three broad economic zones (Figure 1) or triangle into which the country is divided for transport planning process. These are:

- ☐ Industrial zone: defined by the entire Southwestern coastal zone of the country.
- ☐ Tourism zone: formed by the triangle of Siem Reap-Preh Vihear and Kompong Thom.
- ☐ Agro-Industrial and eco-tourism zone: covering the eastern region of the Mekong river, including Ratanakiri and Mondul Kiri.

The work plan for realizing the rehabilitation program is as follows:

- ☐ maximize the regional links (ASEAN/Asian Highway), and the link to neighboring countries;
- ☐ strengthen the planning capability and management;
- ☐ improve cross-border transport facilitation; and
- ☐ continue to rehabilitate, maintain and expand the infrastructure base.

In terms of the last point, the public investment priorities are to first rehabilitate the transport with roads as the first priority and finance improvements in operations and maintenance capability, in order to pave the way for longer-term sector expansion. Rehabilitation and reconstruction of some other National roads serving and facilitating the traffic of goods to provinces which now lack road access altogether during most or all of the year would enable access to areas with significant development potential (tourist centres, agricultural areas, trade-industrial zone, and densely populated delta areas) or which would result in substantial savings to the existing traffic. All major national routes are to be rehabilitated with more permanent bridges constructed with the assistance of the Government of Australia and all road infrastructure will be properly maintained to allow them to carry an increased traffic volume. The pace of improvement of the secondary and tertiary road networks serving rural areas will also be accelerated.

Other immediate plans include technical studies to assess the requirements and priorities for new linking roads and establishing road-bridge maintenance organizations to ensure investment. The government will place emphasis on job generation during project implementation, as these types of projects can provide significant employment during construction using labour-intensive techniques.

4.4 Sector Strategies

The focus of medium term policy and complementary investment action is on additional upgrading of road infrastructure (in particular primary roads); further policy and institutional reform, enhanced cost recovery from road user and institutional capacity building to improve sector management. For the medium term strategy (see Tables 5,6 and 7), it is proposed to speed up the rehabilitation and reconstruction program. Meanwhile, the road planning maintenance program and management needs to be strengthened.

Table: 5 Road Emergency rehabilitation Program (Medium Term)

Classification Road Network	Length (km) 1969 based	Urgent Repair or Rehabilitation 2000-2005, Length (Km)				
		1993-1999	On going and committed	Priority	Add. NR Recon.	Total Length (Km)
National road	4,615	350	1,400	4,800	2000	6,550
Provincial	3,165					
Rural-Local	31,000					
Total	38,700					

Table: 6 Road Strategy







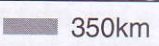




Description		Implementation				
Program Target		6, 000km (New road network)				
-Urgent Repair (short-life)						
-Maintenance:						
-Rehabilitation: 3-5years						
-Maintenance:						
-Reconstruction: 10-20yrs						
-Maintenance:						
Years	2000	2005	2010	2015	2020	

Table: 7 Road Maintenance program

Description	Implementation				
1st year	 350km				
2nd year	 1,342km				
3rd year	 2,365km				
4th year	 4,137km				
5th year	 5,000km				
Length, km	1000	2000	3000	4000	5000

5. Financing Structure

The establishment and implementation of an adequate road maintenance fund is essential in order for Cambodia to benefit fully from the asset already built and to ensure the long-term sustainability of the road network. In this regard, the Government will aim to ensure that the maintenance of the road network, including bridges and ferries. Vehicle registration charges, tolls, international transit fees and fuel levies or other related taxes and duties finance it. The setting-up and introduction of standard unit costs for use in project preparation and sectorised databases describing the nature of sectorised assets, age, condition and maintenance history will provide a basis for formulating a strategy for the meeting of recurrent costs incurred by the capital programmed for roads.

The roads in Cambodia are in a very poor condition. It will cost a lot of money to bring the roads up to good condition and to maintain them. However, failure to repair the roads will cost Cambodia even more in terms of higher vehicle operating costs, excessive travel time and accidents. For example, operating costs for a typical car might reduce from 30 cents/km to 20 cents/km if the road is improved. The cost for a large truck might reduce from about 90 cents/km to 50 cents/km.

The current method of managing the roads is not working very well. Money collected from motorists through fuel taxes and license fees is not being spent on the roads. There are several ways this could be overcome:

- ☐ The current system could be improved. The MPWT could introduce maintenance planning tools which would ensure money spent on the roads was used wisely. This might give the Ministry of Economics and Finance the confidence to increase the amount of money available.
- ☐ A road fund could be introduced under the control of a Road Board. Money collected from users would go into the road fund, and be only available for maintaining the roads. The Road Board would have road user representatives and it would decide how the money in the fund would be used.
- ☐ The management of the main roads and urban roads could be transferred to private companies who would manage the road under contract to the MPWT. Contracts would be for a fixed period of time, after which the contract would be re-tendered. Users would pay the costs of maintaining the main highways through tolls. The contractor who could maintain the road for the lowest tolls would be selected.

(Electronic tolls could be used where a pre-pay card was used rather than there being a need for a large number of tollbooths along the road). Local roads would be paid for through a vehicle license fee.

- ❑ Rural roads could be made the responsibility of the local population; the government could provide materials, and the local people provide the labour.

6. Challenges and Opportunities

The five-year road maintenance targets are as follows (see Table 7):

1st year	350 km
2nd year	1,342 km
3rd year	2,365 km
4th year	4,137 km
5th year	5,000 km

To successfully implement this five-year plan, which includes the rehabilitation of bridges and road maintenance, US\$ 250M will be needed. Public investment, loans, private sector's investment under BOT formula will be included in the implementation of this plan for the rehabilitation and development of the national road infrastructure.

Public investment priorities for 2002-2004 are as follows:

- ❑ Reconstruction of the section Poi Pet-Sisophon, 48 km (Grant/Loan or BOT scheme)
- ❑ Reconstruction of the section Kratie-Srung Treng-Lao border: 198 km
- ❑ Reconstruction of NR78 (O Pomg Meam-BanLung-Vietnam border): 198 km
- ❑ Construction of Second Mekong Bridge, NR1
- ❑ Construction of Sesan Bridge, NR7
- ❑ Construction of NR 66, RP217, RP218 (Siem Reap-Stung Treng): 450 km
- ❑ Construct the Road from Banteay Srey-Boueng Mealea-Koh Ker: 105 km
- ❑ Construct the Road from Banteay Srey-Boueng Mealea-Koh Ker: 105 km

Development of the Road Network in Vietnam

Hon. Nguyen Viet Tien
Minister of Transport, Vietnam

1. Background on Road Transport in Vietnam

The transport sector in Vietnam consists of the full range of transport modes: road, railway, inland waterway, coastal and sea-going shipping, and aviation, with the associated terminals. Since Vietnam has carried out a Renovation Policy in the late 1980s and early 1990s, major investment has been made to the transport sector to help it grow significantly during the 1990s. Inter-provincial traffic flow increased between 1992 and 1999 by a factors of 2 for passengers and 2.9 times for goods. This was supported by the development of transport infrastructure during the 1990s and by partial transport deregulation. Development of the transport sector has been mainly aimed at rehabilitation and upgrading of roads, railway, inland waterways, ports, airports, as well as rural and urban transport. In addition to general reforms, the transport sector saw extensive commercialization. Various new services commenced such as container transport on road, rail and inland waterway, bonded transport, ICD operation, scheduled liner operation (even in coastal shipping), liberalization of the transit transport between Lao PDR, etc. It is worthy of noting that amongst the transport sub-sectors, road infrastructure development is given the highest priority because it is considered that it has greatest and most direct impact on the socio-economic development of the country.

2. Road Administration

The Vietnam Road Administration (VRA) was established in 1993 to administer the road transportation system in Vietnam as a subordinate modal administration under the MOT. The duties of the VRA include the development of strategic, legal and technical directions for road management. The Departments in the VRA report directly either to the Chairman or to the two Vice Chairmen of VRA (see Figure 1).

The VRA manages and plans the maintenance of the 7,969-km national road network through its four regional road management units (RRMUs). The organizational structure of these RRMUs differs from each other. Each RRMU is divided into nine to 14 sub-RRMUs, which in turn allocate maintenance works to depots under their jurisdiction. Each sub-RRMU has between three to seven depots.

Project management units (PMUs) were formed to handle the management of large-scale projects such as the North-South trunk national Road No.1 (NRI) rehabilitation project and My Thuan Bridge construction project. The number of PMUs has been increased based on attractive international financing projects.

VRA's main functions are to:

- ☐ develop road transport strategy and development plans for the country, which are submitted to the Minister of Transport and eventually to the Prime Minister for approval, based on the state's socio-economic development plan and orientation;
- ☐ draft road traffic laws, bylaws and regulations, and state management norms/practices and to put into force road transport-related economic and technical standards/norms according to the Vietnam Road Administration's jurisdiction;
- ☐ directly manage the national road network;
- ☐ act as employer of road infrastructure development projects, according to its responsibility;
- ☐ establish and manage the road signal system;
- ☐ check and inspect road traffic safety, and coordinate with relevant organizations and local authorities to protect road transport infrastructure, to ensure traffic safety, to address offences of transport security and safety, traffic accidents all over the country;
- ☐ study, and implement, scientific techniques and technology of road transport;
- ☐ collect road tolls with the authorization of the Ministry of Finance; and
- ☐ look after driver education/training issues, etc.

3. Description of Road Network

3.1 Road System Classification

Pursuant to the Council of Ministers Organizational Law dated 4 July 1981, Decree No. 35/CP dated 9 February 1981 and Decision 158/CP dated 4 July 1974, the MOT established a classification and administration of road system in Vietnam, aiming to control the construction and repair of roads for the purpose of developing and strengthening the road system, to meet the demands of economic development and to safeguard national security.

The entire road system as established in the said law (including roads for motor and nonmotorized

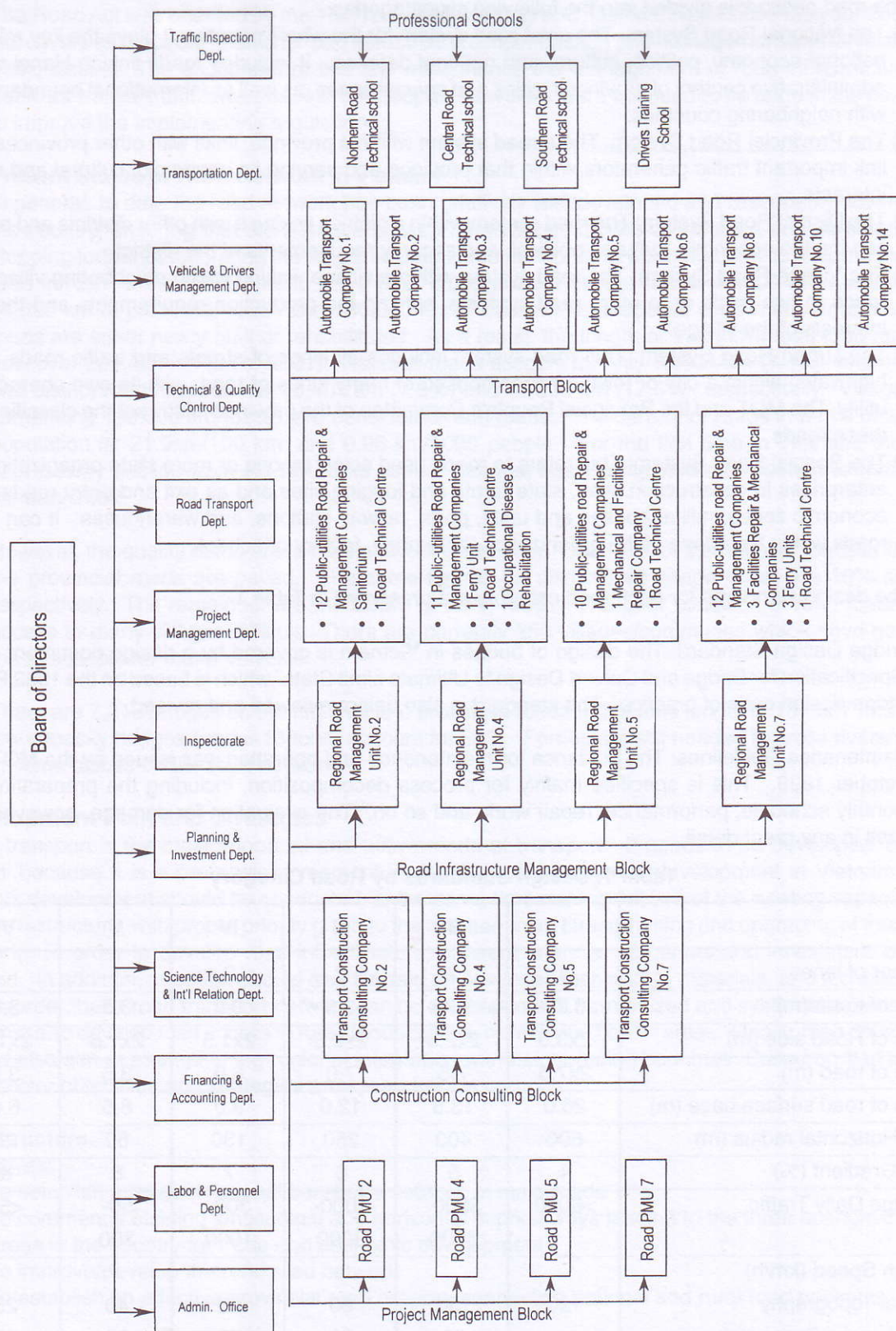


Figure 1: Organization of Vietnam Road Administration

vehicles) in Vietnam is owned by the Vietnamese people, while the MOT is administrator. People's Committees at all levels are responsible for managing the road system within their respective administrative boundary according to the decentralized state administration. State organizations, economic bodies, army units, and all citizens have a responsibility to protect and maintain the road system and to strictly observe regulations on road transportation management.

The road network is divided into the following six categories:

- 1) The National Road System: The chief road system for the whole country. It plays the key role in the national economy, politics, culture, and national defense. It includes roads linking Hanoi with the administrative centers of provinces, cities and special zones, as well as international boundary points with neighboring countries.
- 2) The Provincial Road System: The a road system within a province, links with other provinces. They link important traffic generators within that province and serving its economic, cultural and security interests.
- 3) The District Road System: The road system within a district, linking it with other districts and primarily serving the economic, cultural, political, and security requirements of the district.
- 4) The Village Road System: The road system within a village, linking it with neighboring villages and roads to rice fields or to other road systems, serving the production requirements and the public interests of the village.
- 5) The Urban Road System: This road system includes all kinds of streets and traffic roads (except highways) within a city or town. It is composed of many kinds of road, with its own character and utility. The MOT and the Provincial People's Committee of the province jointly set the classification of these roads.
- 6) The Special Road System: This refers to roads used solely by one or more state organizations and enterprises in construction sites, state farms and logging sites and as exit and entry roads of new economic zones, military bases and units, ports, railway stations, and warehouses. It can include roads within the scope of the organization, enterprise, factory or school.

The design standards for each road category are presented in Table 1.

Bridge Design Standard: The design of bridges in Vietnam is covered by a design document entitled "Specification for Bridge and Culvert Design to Ultimate Limit State" which is based on the 1962 Russian bridge design code of practice. The standard is also being reviewed and revised.

Maintenance Guidelines: The guidance for maintenance and operation was issued by the MOT on 11 October 1996. This is specified mainly for process decomposition, including the preparation plan, monthly schedule, performance, repair work, and so on. The evaluation for damage, however, is not dealt in any great detail.

Table 1: Design Standards by Road Category

Class	I	II	III	IV	V	VI
Number of lanes	4	2	2	2	1	
Width of Lane (m)	3.75	3.75	3.5	3.0	3.5	3.5
Width of Road side (m)	2x3.0	2x2.5	2x2.5	2x1.5	2x1.5	2x1.5
Width of road (m)	2x7.5	7.5	7.0	6.0	3.5	3.5
Width of road surface base (m)	26.0	13.5	12.0	9.0	6.5	6.0
Mini. Horizontal radius (m)	600	400	250	130	60	25
Max. Gradient (%)	4	5	6	7	8	9
Average Daily Traffic	>6000	3000-6000	1000-3000	300-1000	50-300	<50
Design Speed (km/h)						
Normal Topography	120	100	80	60	40	25
Mountainous Topography		80	60	40	25	15

3.2 Administration of Road System

The authority to classify and regulate the road network lies in the following offices:

- ☐ The Minister of the MOT determines the highway system classification.
- ☐ The Chairman of the Provincial People's Committee determines the classification of the provincial, urban and special road systems.
- ☐ The Chairman of the District People's Committee determines the classification of the district and village road systems.

The Road Act was enacted by the 10th national assembly and has been valid since the year 2002. This Act covers all respects related to road infrastructure maintenance and management and all related road traffic issues. The enactment of this law will enhance the management of road infrastructure, road traffic as well as traffic awareness of the people. However, more will need to be done in the near future to improve the implementing regulations

3.3 Present Status of Road Network in Vietnam

In general, to date the road network has been relatively well developed and reasonably covered all of the country, ensuring that the linkages between the various modes of transport and, to some extent, stopping further deteriorating the long time untouched transport network. Taking into account the recent road infrastructure development, more than 3,000 km of national roads, 12,500 m of bridges, over 16,000 km of provincial roads and 180,000 km of district roads, special used roads, urban and rural roads are either newly built or rehabilitated. As a result, the length of Vietnam's total road network is now over 209,425 km (as of 2001). National roads account for only 15,401 km (7.4%), and provincial and district roads account for 16,403 km (7.8%) and 36,905 km (17.6%), respectively. Village roads, comprising 130,000 km (63%), are considered rural roads. The density of roads in terms of area and population is: 21.9km/100 km² and 0.96 km/1000 people. For the first time in Vietnam, the 30-km expressway section from Ha Noi to its suburb has just been completed and opened to traffic since January 2002.

However, the quality of the entire road network is still poor. Only 73% of the national roads and 30% of the provincial roads are paved. The same figures for district and village roads are 10% and 25% respectively. The remainder are macadam or earth roads. The poor condition of rural roads makes access to many villages difficult. There are currently 250 villages/communes which have no access roads suitable for motor vehicles.

There are 7,213 bridges on the national and provincial roads with a total length of 187,287 m; of these, low capacity bridges (under 13 tons) account for 20%. Ferries are still needed to cross rivers/streams in some places on the road network.

4. Development Plan and Strategies

Road transport is the most important and active mode of transport. It needs to be developed 'one step ahead' because it is a prerequisite momentum for the socio-economic development in Vietnam. Road network development should be conducted, at the same time making full use of the existing capacity of the road infrastructure, with proper priority given to the maintenance, strengthening and upgrading of the existing network. In order to develop road infrastructure, different financial resources and investment ways are needed. In addition, attention should also be paid on advanced technology, materials, and technical know-how in order that a road transport network can be developed in a harmonized and systematic manner. It is also crucial to develop road access to rural, mountainous, remote and border areas. Finally, road development should also aim at strengthening regional integration with neighbouring countries. Based on that concept, road sector objectives and strategies are set as follows:

Infrastructure

Objectives:

- ☐ To establish a reliable national backbone network of main roads
- ☐ To commence building longitudinal and horizontal expressways leading to the three economic triangle areas in the country for trade and economic development
- ☐ To improve/develop the rural road network
- ☐ To establish an effective provincial road network connecting national and rural road networks

Strategies:

- ☐ Complete the rehabilitation of the main/secondary network
- ☐ Complete the primary/secondary network
- ☐ Accelerate tertiary/local road development

Institutional/Competitive Framework

Objectives:

To strengthen road administration capacity at national/local levels

- ☐ To establish a competitive environment to promote efficient and high quality services

- ☐ To set and enforce justifiable minimum safety and environmental standards

Strategies:

- ☐ Implement a legal framework with clear, enforceable minimum standards without other regulatory obstacles
- ☐ Strengthen national/local road planning and maintenance systems
- ☐ Provide training in road maintenance management systems, contracting and other business skills
- ☐ Set higher standards and improve competition in the construction industry

Financing

Objectives:

- ☐ To establish a sustainable funding mechanism for road maintenance and development that is supported by road users

Strategies:

- ☐ Sustainable funding for road maintenance (better budgeting and road fund)
- ☐ Sustain ODA funding
- ☐ Develop own fund sources
- ☐ Develop government-people partnerships

5. Road Financing Structure

5.1 Budget Allocation System

Capital Construction – National Road System: The Ministry of Planning and Investment (MPI) allocates and directly specifies the planning quota for Groups A and B projects. Group B projects are those whose total investment costs are between VND 30 billion up to VND 400 billion¹. Group A projects are those whose total investment costs are above VND 400 billion.

The Ministry of Transport (MOT) allocates and assigns the planning quota to Group C projects based on the total controlled fund allocated by the MPI. Group C projects are those whose total investment costs are below VND 30 billion.

The Ministry of Finance's General Department for Investment and Development, through its Provincial Department for Investment and Development (MOF), disburses the allocated fund in accordance with the basic work quantity completed by the contractors for the projects.

Capital Construction – Provincial Road System: The MPI allocates and directly specifies the planning quota to provinces and cities according to the list of identified projects. The method of disbursement is similar to that of the National Roads System.

Capital Construction – District Road System and Other Road Systems: The provinces and cities balance the fund for these systems. Fund disbursement is done through their respective financial units.

Roads and Bridges Maintenance – National Road System: The MOF allocates and directly specifies the planning quota to the MOT in which the allocation for the road subsector is concretely identified. Based on the allocated fund, the VRA allocates and assigns the planning quota to the RRMUs and Provincial Transport Divisions authorized to manage the national road system. The method of disbursement is done through the system of budget departments and the Provincial Division for Finance and Pricing of provinces and cities.

Roads and Bridges Maintenance – Provincial Road System and Other Road Systems: The MOF allocates and directly specifies the planning quota to the provincial transport sector. The province in turn balances and allocates the planning quota to local transport projects through their provincial transport divisions. The method of disbursement is similar to that of the National Road System.

Investment in the Road Network in 1995-to date: It was noted that before 1995, there was only one financial source from the State budget for transport infrastructure development in general and road one in particular. Since 1995, the State has made substantial investments into the maintenance and development of the road network. Capital resources were diverse: besides domestic capital, there were foreign sources such as soft loans from foreign countries and international financial organizations.

Mobilized resources from the people were also large: there were contributions of materials, labor days or money. On average, more than VND 600 billion and several million working days/year were mobilized. As a result, the condition of the roads was considerably improved and many important national roads were rehabilitated, upgraded or constructed. Urban transport was also improved. However, investment capital for road network maintenance and development is still limited. Current sources meet only 60% and 40% of the total requirement of basic construction and road repair capital, respectively.

According to the present organization structure of the Ministry of Transport, road maintenance and repairing are the responsibility of VRA, while road construction is within jurisdiction of the Ministry of Transport. Figure 2 shows how the VRA and its dependant units obtain funds for maintenance works.

For the period for 2001-2010, it is expected that U\$5,750 million from ODA sources and U\$1,670 million from local funds will be needed for construction and improvement of the road network. In addition, it is estimated that about U\$ 80-90 million annually will be required for road network maintenance (Figure 3).

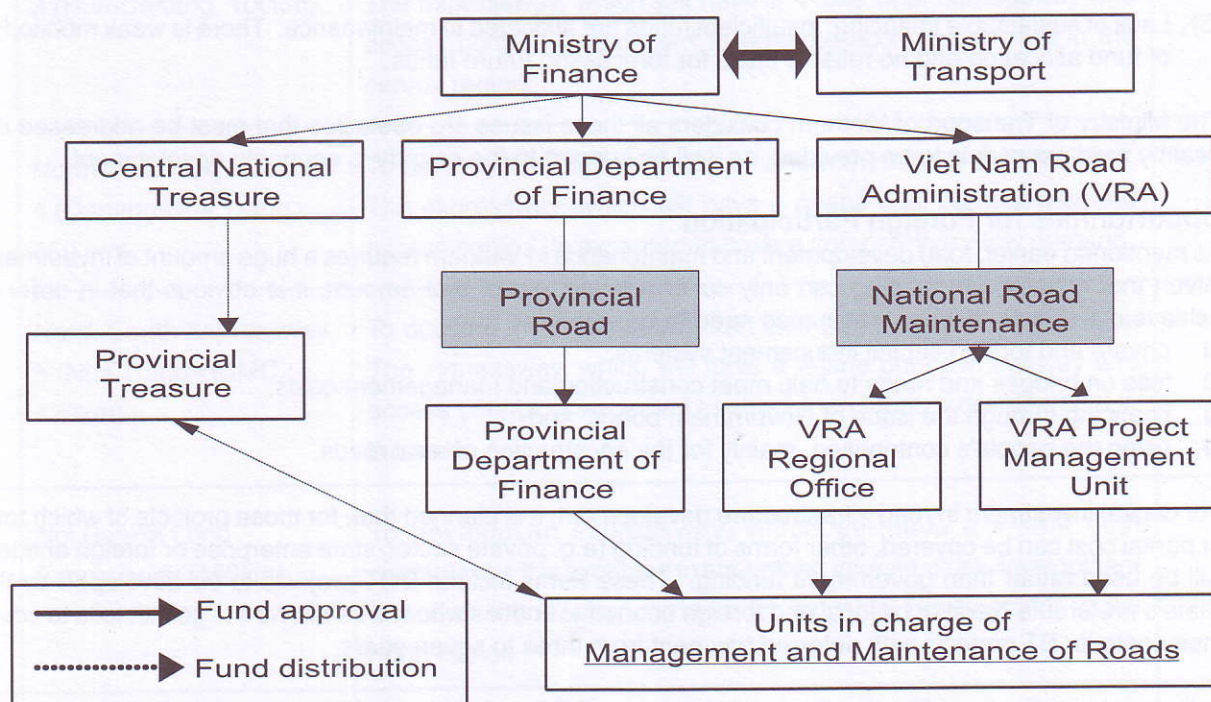


Figure 2: Scheme for Road Maintenance Financing

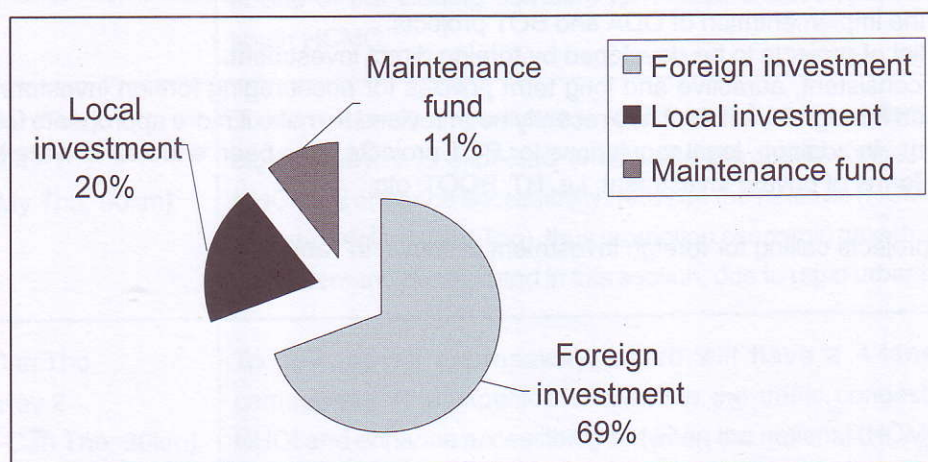


Figure 3: Expected Shares in Foreign and Local Investment for Road Development and Maintenance

5. Challenges

The main issues confronting the road sector include the following.

- (1) Poor primary/secondary roads: many roads are in poor condition because of the lack of maintenance systems, efficient organizations and working methods, and finance. Low design standards hinder operation of modern large trucks and buses.
- (2) Lack of tertiary roads: many roads only exist on the map.
- (3) Lack of legal framework: there are many gaps in definitions, guidance documents and procedures for road management.
- (4) Weak infrastructure management, especially at the provincial level where there is a lack of guidance on planning, guiding, controlling and monitoring infrastructure. New road/bridge/pavement management systems are required.
- (5) Lack of sustainable financing: insufficient funds are allocated to maintenance. There is weak monitoring of fund allocation and no reliable basis for forecasting future funds.

The Ministry of Transport of Vietnam considers all those issues are obstacles that must be addressed if a healthy road network is to be provided, as well as support to the country's economy development.

6. Opportunities for Foreign Participation

As mentioned earlier, road development and maintenance in Vietnam requires a huge amount of investment. Given that government funding can only cover a small part of that amount, it is obvious that in order to achieve our targets, different resources need to be mobilized from:

- ☐ private and foreign capital inducement systems;
- ☐ tolls on bridges and roads to help meet construction and management costs;
- ☐ financing through the issue of Government bonds; and
- ☐ using the people's contribution, mainly for the construction of rural roads.

For capital investment in road infrastructure development, it is planned that, for those projects of which total or partial cost can be covered, other forms of funding (e.g. private sector, state enterprise or foreign entities) will be used rather than government funding. These forms include BOT projects to be developed by the State's preferable credit or by local and foreign economic entities who will be allowed to collect tolls to cover their costs, or BT projects with deferred payment from three to seven years.

In terms of mobilization of foreign financial resources (ODA and direct investment), policies/activities are as follows:

- ☐ Stipulate appropriate policies and mechanism in dealing with internal matters, such as the provision of adequate counter funds, clearance of land, and compensation and resettlement schemes in order to facilitate the implementation of ODA and BOT projects.
- ☐ Define a list of projects to be developed by foreign direct investment.
- ☐ Maintain consistent, attractive and long term policies for encouraging foreign investors' participation. The Law on Foreign Investment has recently been revised to make it more appropriate for direct foreign investment. In addition, legal regulations for BOT projects have been enacted and are being revised.
- ☐ Diversify forms of private investment, i.e. BT, BOOT, etc.

A list of road projects calling for foreign investment is shown in Table 2.

Table 2: Road Projects Calling for Foreign Investment

No.	Projects	Description	Cost*
1	North-South Expressway 1 (Hanoi-Vinh, 310 km)	To develop the third North-South axis with modern road facilities. The expressway, which will have a 4-lane dual carriageway and access control, will be in a high economic growth corridor.	930
2	North-South Expressway 2 (Vinh-Hue, 400km)	To develop the third North-South axis with modern road facilities. The expressway, which will have a 4-lane dual carriageway and access control, is expected to have less traffic demand.	1,200
3	North-South Expressway 3 (Hue-Danang, 100km)	To develop the third North-South axis with modern road facilities. The expressway, which will have a 4-lane dual carriageway and access control, is expected to promote economic growth in the central region.	300
4	North-South Expressway 4 (Danang-Nha Trang, 550 km)	To develop the third North-South axis with modern road facilities. The expressway, which will have a 4-lane dual carriageway and access control, is expected to have a comparatively low demand.	1,650
5	North-South Expressway 5 (Nha Trang-HCMC, 420km)	To develop the third North-South axis with modern road facilities. The expressway, which will have a 4-lane dual carriageway and access control, is expected to strengthen tourism development in the area.	1,260
6	Noi Bai-Ha Long Expressway (150km)	To develop an expressway, which will have a 4-lane dual carriageway. It is expected to strengthen infrastructure development in one of the leading corridors for industrial development in the north Hanoi.	750
7	HCMC-Vung Tau Expressway (90km)	To develop an expressway, which will have a 4-lane dual carriageway. It is expected to strengthen infrastructure development in one of the leading corridors for industrial development in the south HCMC.	450
8	HCMC-Can Tho Expressway 1 (HCMC-My Tho; 50km)	To develop an expressway, which will have a 4-lane dual carriageway. It is expected to alleviate the traffic congestion on NHOI and enhance accessibility between the national (HCMC) and regional centers (Can Tho), thus promoting economic growth. Higher traffic demand is estimated in this section, due to rapid urbanization.	350
9	HCMC-Can Tho Expressway 2 (My Tho-Can Tho; 80km)	To develop an expressway, which will have a 4-lane dual carriageway. It is expected to alleviate the traffic congestion on NHOI and enhance accessibility between the national (HCMC) and regional centers (Can Tho), thus promoting economic growth. Higher traffic demand is	560

¹ One US dollar is equivalent to 15,200 dong (early 2002).

The Challenges And Opportunities For Road Development In Singapore

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Land Transport Authority of Singapore

1. Introduction

The Singapore Government formed the Land Transport Authority (LTA) on 1st September 1995 to spearhead improvements to the land transport system. The LTA has set out a vision to provide Singapore with a world class land transport system and its mission is: "To provide a quality, integrated and efficient land transport system which meets the needs and expectations of Singaporeans, supports economic and environmental goals, and provides value for money."

The 1996 White Paper set out how the LTA intends to achieve its mission, its transport vision for Singapore, its operating philosophy and the initiatives it will take in the short and long term.

Over the last 15 to 20 years, the demand for transport had been explosive as the Singaporean society became more mobile and physically dispersed. The number of vehicular trips grew annually by 7%, from 2.7 million trips in 1981 to more than 7 million trips a day now. It is expected to grow to 10 million trips per day by 2010.

Building an efficient road network is an integral part of the LTA's mission. The road network must be comprehensive to sustain economic activity and provide good connectivity to various parts of Singapore. In 1996, roads already constituted 12% of the total land area. This is similar to the landtake for housing in Singapore and will gradually continue to increase.

The purpose of this paper is to provide an insight into Singapore's road development plans and road development strategies. It will also highlight some of the difficulties and challenges encountered in road building in an urbanised Singapore.

2. Description of Road Network

Roads in Singapore are classified into five main groups; expressway, semi-expressway, major/minor arterial, primary access and local access. Table 1 details the road classifications in Singapore. Figure 1 shows the typical cross-section of expressways in Singapore, whilst Figure 2 shows the expressway network in Singapore.

The road lengths by the different classifications as at January 2002 are shown in Table 2.

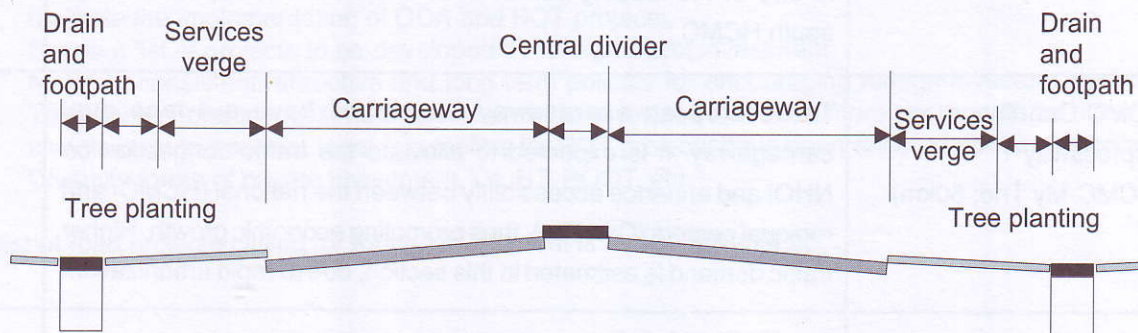


Figure 1: Typical Cross-Section of Singapore Expressways

Table 1: Road classifications in Singapore

Road Classifications	Purpose	Width of Road Reserve
Expressway	The roads are designed to handle large volumes of traffic at continuous, high speed and long distance travel. The roads are usually connected via grade-separated interchanges.	a) 8 lanes - 52.90m b) 6 lanes - 45.50m
Semi-expressway	They form the links between the expressway network and roads within the local areas. Semi-expressways usually have a more stringent access control and are provided with grade-separated interchanges at key intersections.	a) 8 lanes - 45.40m b) 6 lanes - 38.60m
Major/Minor Arterial	They form the links between the expressway network and roads within the local areas. They are usually not grade separated.	a) 6 lanes - 38.60m b) 4 lanes - 31.80m
Primary Access	These roads distribute traffic within the local areas. They link the arterial roads with the local access roads. They also include streets used principally for through traffic movements within a local area and for access to abutting properties.	a) 4 lanes - 26.20m b) 2 lanes - 21.40m
Local Access	These roads give direct access to buildings and land within local areas. Traffic movement is relatively slow and through traffic movement is discouraged.	a) 2 lanes - 15.40m b) 2 lanes - 12.20m

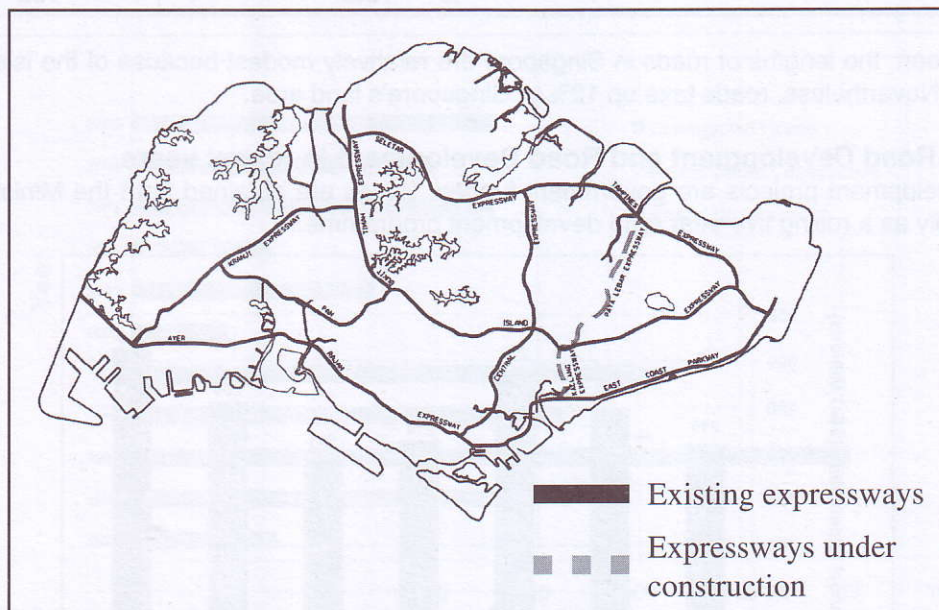


Figure 2: Expressway network in Singapore

Table 2: Road Classifications and Respective Lengths

Road Classification	Length (km)
Expressways	150
Semi-Expressway/ Major / Minor Arterial roads	573
Primary Access roads	387
Local Access roads	2009
Total	3119

There are currently eight expressways in Singapore: Ayer Rajah Expressway (AYE), Bukit Timah Expressway (BKE), Central Expressway (CTE), East Coast Parkway (ECP), Kranji Expressway (KJE), Pan Island Expressway (PIE), Seletar Expressway (SLE) and Tampines Expressway (TPE). The construction of a ninth expressway, the Kallang / Paya Lebar Expressway (KPE) is ongoing and is scheduled for completion in 2006. Details are presented in Table 3.

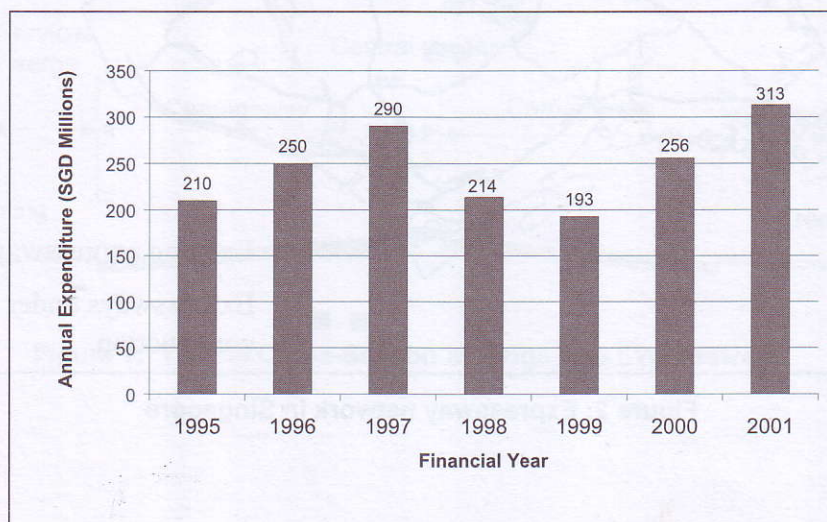
Table 3: Tabulation of all the expressways in Singapore and their corresponding lengths

No	Expressway Name	Length (km)
1.	Pan-Island Expressway (PIE)	44
2.	East Coast Parkway (ECP)	19
3.	Central Expressway (CTE)	16
4.	Bukit Timah Expressway (BKE)	11
5.	Ayer Rajah Expressway (AYE)	26
6.	Tampines Expressway (TPE)	14
7.	Kranji Expressway (KJE)	8
8.	Seletar Expressway (SLE)	12
9.	Kallang / Paya Lebar Expressway* (Scheduled for completion by end 2006)	12
	Total	162

As can be seen, the lengths of roads in Singapore are relatively modest because of the island's compact dimension. Nevertheless, roads take up 12% of Singapore's land area.

3. Financing Road Development and Road Development in recent years

All road development projects are government-funded. Funds are obtained from the Ministry of Finance (MOF) usually as a rolling five-year road development programme.

**Figure 3: Yearly Expenditure on Road Development in Singapore since 1995**

Over the last few years, the expenditure for road development projects had been increasing steadily from SGD193 million in 1999 to SGD313 million in 2001, as shown in Figure 3. In the 1996 White Paper, it was estimated that SGD1.1 billion would be expended to increase the road network in Singapore by another 225 lane-km over a five-year period. By end 2000, the LTA had already surpassed the target by constructing 415 lane-km of new roads with a budget of less than SGD1 billion. Singapore now has a total of 8181 lane-km of roads.

4. Road Development Strategies and Future Road Projects

The five-year road development programme is aimed at meeting the growth in traffic demand arising from continuing commercial, industrial and residential developments in various parts of Singapore. Road development must be carefully planned and staged to ensure adequate road capacity to support vital economic activities and provide better connectivity between existing areas and new areas of development. Good road connectivity benefits not only private transport but also public transport such as buses and taxis.

The identification of roads for building by the LTA is an integrated process. The overall blueprint of Singapore's road network is in the Concept Plan of Singapore which is reviewed and updated every 10 years. The Concept Plan charts the land use strategies and the transport strategies and policies, identifying the rapid transit systems as well as the road network needed to support the planned growth. With this as a blueprint, the LTA works with land use planners to identify shorter term growth areas and also monitors traffic continuously to chart shorter term plans for road building.

The design of roads is done internally by LTA's road and traffic engineers with inputs and support from our civil, structural, geotechnical engineers and quantity surveyors. Although most roads are internally designed, the LTA adopts design and build arrangements for selected projects.

Road building is undertaken through contracts. Open tenders are called and evaluated based on price and other criteria. The prospective contractors have to demonstrate their competence to carry out the works and their understanding of the tasks and the associated risks. The contract is awarded to the successful tenderer after obtaining the approval from the Tender Board.

In January 2002, the LTA was managing a total of 48 road contracts with a combined contract value of SGD1.286 billion. Over the next four years, the LTA will expand the road network in Singapore by another 200 lane-km as shown in Figure 4.

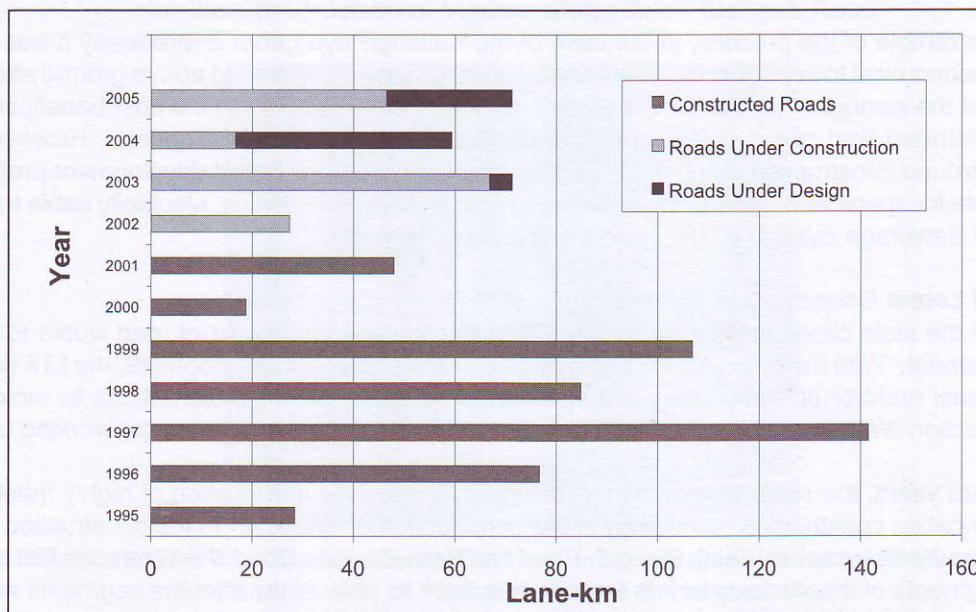


Figure 4: Development Programme for New Roads in Singapore

The major ongoing projects consist of construction of expressways and semi-expressways, expansion of junctions and road interchanges, construction of viaducts and underpasses, upgrading and widening of existing roads and reconstruction and upgrading of vehicular bridges.

As at February 2002, the LTA is currently working on the planning and design of more than twenty road projects. It will include construction of new expressway, expansion of major arterial roads and upgrading of key junctions. To speed up traffic flow while minimising land use, the LTA is in the process of converting selected junctions into 2 to 4-tier interchanges. The recent completion of Singapore's first four-tier interchange at Upper Serangoon Road and vehicular underpass along Clementi Avenue 6 have eased the peak hour traffic congestion considerably. The LTA has also commenced the construction of an elevated semi-expressway along Telok Blangah Road and Pasir Panjang Road to provide a new high capacity east-west corridor between Jurong and the city.

The LTA has also commenced on the construction of Kallang/Paya Lebar Expressway (KPE) in 2001. The 12 km KPE would be 75% underground, making it the longest underground expressway in South-east Asia. Four civil tenders were called and two contracts were awarded in 2001. Two more civil contracts will be awarded in the coming months. The KPE will be built across densely-populated and well-developed areas to serve the north-east corridor of new townships in Sengkang and Punggol. When completed, it will reduce the travel time required to travel to the city centre and alleviate congestion along the CTE during peak hours.

The LTA has also completed the feasibility study of the Singapore Underground Road System (SURS) around the city centre to serve the anticipated growth of the city, particularly in Marina South. SURS promises the equivalent of 40% more road capacity within the city area. The capital cost for SURS is high, in the region of SGD4.8 billion. A decision has however not been made on its implementation schedule.

5. Challenges Associated With Road Development in Singapore

In an urbanised environments like Singapore, road development projects are almost always required at locations where the areas are already heavily built-up, both above and below ground. The various challenges are highlighted below:

5.1 Evolving the Best Design

In a land scarce environment such as Singapore, the implementation of major road development projects requires careful planning. In the selection of the routing details, various factors have to be taken into account eg the existing land uses, the existing road system, planning commitments, land take, estimated construction cost, existing traffic flows and characteristics, bus routes and the route and location of large underground utility services, just to mention a few. Alternative designs are evolved using our road design software and appraised before the best design is selected for detailed development and implementation.

As an example of the process, in the case of the Kallang/Paya Lebar Expressway it was found to be more economical to construct the expressway underground compared to above ground after taking into account the savings in land take, the environment and other factors. In the cost-benefit studies it was demonstrated that going underground appeared to be an attractive option. However, even for underground construction, the LTA also faces many challenges as road development projects have to compete for space with underground Mass Rapid Transit (MRT) tunnels, electricity cable tunnels, Deep Tunnel Sewerage System (DTSS) and the link sewer network.

5.2 Use of Latest Construction Technology

One of the main challenges faced by the LTA is to minimise the impact of road works to surrounding environment. With the heavy traffic along most of the roads under development, the LTA has to ensure that equal number of traffic lanes are maintained so as to minimise disruptions to motorists during construction. With these constraints, the contractor is often given a very narrow working corridor.

In recent years, the road development projects have seen the introduction of highly mechanised and prefabrication construction technology in the construction of viaducts. In the construction of the semi-expressway viaduct along Telok Blangah Road and Pasir Panjang Road, the contractor first prefabricated the segments of the viaducts before transporting them to site. At the site, the segments were installed using an overhead launching system. The use of 'balanced cantilever precast segmental launching method' has reduced the time required to occupy the ground level for the viaduct construction and minimised the construction impact on motorists.

The timely and successful completion of the Telok Blangah Road (Figures 5 and 6) and Upper Serangoon Road (Figure 7) projects involving the construction of viaducts above existing carriageway is a testimony

to the benefits resulting from the implementation of mechanised and prefabrication construction technology.

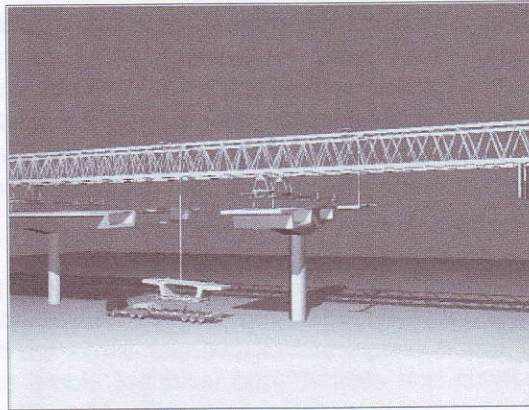


Figure 5: 'Balanced Cantilever Precast Segmental Launching Method'
(used in the construction of elevated semi-expressway along Telok Blangah Road)



Figure 6: Use of 'balanced Cantilever Precast Segmental Launching Method'
for the Construction of Viaduct along Telok Blangah Road

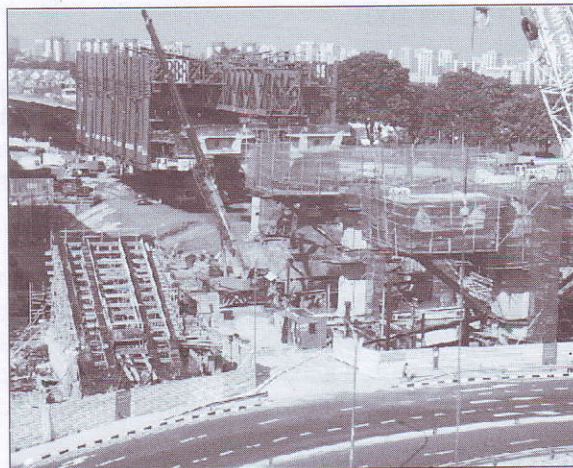


Figure 7: The use 'Span by Span Cast Insitu Suspended Formwork Method'
for Construction of Viaduct at Upper Serangoon Road

5.3 Underground Utilities

One unique feature in Singapore is that all utility services are located underground within the road corridor, either beneath the existing carriageway or at the side-table. Roads in heavily built-up areas are usually full of underground utility services. These include sewer, water main, gas, power,

telecommunication copper or fibre optic cables. In almost all the road development projects, the diversion of utility services is inevitable.

If utility services were found to obstruct the permanent structure, the LTA would normally consider redesigning the structure first. Sometimes, the existing utility services are suspended by temporary supports while works are being carried out beneath them. Diversion of underground utility services is normally carried out as the final resort when all avenues to avoid the services for the works are exhausted. The diversion of utility services is expensive and time-consuming. For example, the diversion of fibre optic cables could stretch for several kilometres and requires several months for diversion. Diversion of high voltage cables can cost millions of dollars and take up to 2 years.

When working in areas close to utility services, special protection and precautions have to be taken to ensure that these utilities are not damaged during the construction works. The LTA works closely with utility agencies and contractors to ensure that all diversion works are carried out safely and smoothly.

Realising the needs of an independent underground concrete structure specifically for the housing of utility services, Singapore embarked on a study to implement Common Services Tunnels (CSTs) in 1996 for the new downtown area. CSTs are purpose-built underground concrete structures for the housing of utility services such as electrical cables, communication cables, water pipes, cooling systems and gas pipes. With CSTs, these services will be located within the tunnels and all installation, repairs and maintenance of service pipes and cables can be carried out underground without the need to excavate roads.

5.4 Traffic Safety

For road development projects, the works on or near the carriageway will inevitably affect the safety and free movement of vehicles and pedestrians. The LTA accords paramount importance to safety at work sites. The Chief Executive of the LTA has given full endorsement to the safety policy that outlines our goal, commitments, strategies and roles in pursuing excellence in safety. All reasonable steps are taken to keep any undesirable or adverse effects to motorists to a minimum through the implementation of effective traffic control. Traffic control aims to provide adequate warning and clear information to motorists about the nature of works on site and the actions required by the road users to pass through the work zone safely. Proper traffic control at the same time also protects those who are carrying out the works.

The LTA first issued the Code of Practice on 1st June 1998 under Regulation 12 of the Street Works (Works on Public Streets) Regulations 1995. The latest revised Code of Practice: Traffic Control at Work Zone was released on 1st June 2001.

The Code of Practice deals with the standards, procedures and other requirements pertaining to works carried out on public streets. The implementation of a standardised advance warning and information system will guide and forewarn motorists at the work zones. The LTA also requires the contractor to engage a full-time Registered Safety Officer (with the Ministry of Manpower) at the site to ensure that the safety requirements are met at all times.

The lane closures are also kept to a minimum in terms of capacity and duration. Press and radio announcements are also regularly used to inform motorists of road works. Motorists can also log onto the LTA traffic.smart portal (<http://traffic.smart.lta.gov.sg>) to obtain comprehensive real-time traffic information and plan their travelling routes accordingly. The LTA project team also conducts regular and scheduled safety inspections at work sites to ensure that safety requirements are met at all times.

The LTA also ensures that safety assessments are carried out during the design, construction and operation stages. The LTA adopts a structured process called the Project Safety Review (PSR) system that requires developers and contractors to prepare safety submissions of their proposed projects for review by LTA's safety regulator. The projects will proceed only if the submissions are accepted. The PSR system would ensure that the LTA has an effective safety management tool that is in line with best international practices.

5.5 Site Management & Environmental Control

Many road construction and development sites are located near to residential and built-up areas. To ensure that residents in the neighbourhood are not unduly inconvenienced or subjected to public health hazards, the LTA requires contractors and site managers to pay great attention to environmental health issues such as noise control, vector control and waste management that may arise from work sites. All contractors at the construction sites are required to comply with the Environmental Public Health (Registration of Environmental Control Officers) Regulations 1999. The Environmental Control Officers are employed by the contractors to assist them in monitoring environmental health issues and ensuring that the regulations are complied at all times.

6. Conclusions

Road development would continue to play a vital role in the land transportation development in Singapore to maintain mobility. As Singapore becomes more urbanised, the road development projects are becoming more challenging. The construction of vehicular underpasses, viaducts, tunnels and multi-tier interchanges in an urban setting provides ample technical opportunities and challenges to our engineers and road consultants and contractors. The LTA will continue to develop buildable, innovative and efficient designs of roads and road structures, which take into account new materials and new construction methods. The success in the implementation of road projects requires good partnerships between the contractors, the consultants and the LTA. The LTA looks set to achieve the corporate mission of having a world class transport system and delivering quality projects to meet the needs of Singaporeans.

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Challenges and Opportunities for Road Development in The Philippines

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1. The Current Situation

The length of the overall road network in the Philippines at the end of 2000 was 201,834 km, which translates into a density of 0.67 per square km of land area. This density is already much higher than those of over developing countries in the ASEAN region. In terms of road quality, however, as measured by the paved road ratio, i.e. the length of paved roads over the total length of roads, the Philippines falls below its neighbours as shown in Table 1.

Table 1: Comparison of Road Densities and Paved Road Ratios, Philippines and other ASEAN Developing Countries

Country	Road Density (km/km ²)	Paved Road Ratio
Philippines	0.67	0.21
Indonesia	0.19	0.47
Malaysia	0.20	0.74
Thailand	0.42	0.82
Vietnam	0.46	0.35

The length of the road network in 2000 was more than 18,000 km then the total length in 1998. This increase was due to the growth in barangay roads. The length of road, and paved road ratio, according to road classification, at the end of 2000 is shown in Table 2.

Table 2: Lengths of Road and Paved Road Ratios, According to Road Classification

Classification	Length (km)	Paved Road Ratio
National Roads	29,878	0.62
National Arterial	16,799	0.70
National Secondary	13,079	0.51
Provincial Roads	27,136	0.21
City Roads	7,052	0.77
Municipal Roads	15,804	0.34
Barangay Roads	121,965	0.07
Total	201,834	0.21

The low ratio of paved barangay roads (7%) resulted in the overall national average of paved road being only 21 percent. However, only very few barangay roads carry substantial traffic which warrants paving; the remainder should be upgraded and maintained as all-weather unpaved roads.

Investments for rehabilitation and upgrading of the National road system (29,878 km) resulted in an improvement in the quality of both paved and all-weather roads as shown in Table 3.

Table 3: Comparison of Length of Paved National Roads in 1998 and 2000

	1998		2000	
	PAVED	ALL-WEATHER	PAVED	ALL-WEATHER
National Arterial Roads (16,799 km)	68%	90%	70%	95%
Nabonal Secondary Roads (13,079 km)	42%	77%	51%	80%
Total National Roads (29,878 km)	60%	84%	62%	88%

About 89% of the 276,878 lineal meters of bridges along National roads are now permanent structures, compared to 83% in 1998.

The Government has recently completed improvement to the Pan-Philippine Highway in most parts of the Cagayan Valley and the Camarines provinces. It has also completed the Sto Tomas-Lipa Expressway. Works currently being undertaken include the upgrading of arterial roads in developing regions, particularly the Pan-Philippine Highway from Camarines to Sorsogon and from Agusan del Norte to Compostella Valley and also those in Negros, North Cebu, Samar, the Zamboanga Peninsula, and the General Santos-Davao-Bukidnon corridor. However, inadequate funding for road maintenance over the past few years has resulted in a huge backlog of rehabilitation, thus pre-empting funds which otherwise would have been used for additional road improvement and new construction works.

A Road Safety Program has also recently been instituted. The department of Public Works and Highways (DPWH) has commenced the installation of a computerised Road Information and Management Support System to improve the quality and delivery of services in the provision and management of the national road network.

About 85%, or 171,957 km of the total Philippine road network, is composed of provincial, city, municipal and barangay roads which fall under the responsibility of the Local Government Units (LGUs). However, due to inadequate financial and technical resources, only about 15% of these local roads are paved. Excluding barangay roads, 31% of the remaining local roads are paved.

Road transport has been, and will continue to be, the dominant mode of transportation in the Philippines, accounting for about 22 billion ton-kilometres per year or 53% of the total domestic freight traffic, and about 83 billion passenger-kilometres per year, or 89% of the total domestic passenger traffic. Almost all intra-island traffic is carried by the road network.

The principal deficiencies in the highway network are as follows:

- ☐ About 21% of the total length of all roads is paved and 79% is unpaved.
- ☐ Only 70% of the total national arterial road network is paved, 48% of the paved network needs rehabilitation and 30% is unpaved.
- ☐ Of the 51% of the national secondary roads that are paved, 40% need to be rehabilitated and 48% is still unpaved.
- ☐ Some national roads, provincial and barangay roads require upgrading because they were constructed to low standards, construction was deficient and/or substandard, maintenance is inadequate and/or they are being damaged by overloaded vehicles.
- ☐ The areas where roads are most sparse and unimproved are also the most economically undeveloped.
- ☐ Missing or weak bridges lessen the usefulness of many roads. About 26% of the existing structures must be rehabilitated, or replaced and retro-fitted.

2. Goals and Objectives

The overall transport goal is to provide a fully integrated, multi-modal transportation system that is safe, convenient, reliable, fast, efficient, ecologically sound and competitively priced, *and which* supports the Government's overall economic and social development goals. *Another objective is to provide access to basic services and markets in rural and agricultural areas at all times of the year.*

3. Policies and Strategies

To support economic growth and regional development, the national Government will focus on a select group of strategic national roads comprising about 29,900 km in length, which will all be upgraded to international standards. Public-private sector partnership shall be expanded, especially in the development of toll expressways along clogged road arteries.

The management and financing system for national roads shall continue to undergo a paradigm shift, whereby the provision of these roads is conducted in a businesslike manner in which road user pay for the road services they receive. Two measures will be undertaken to develop this commercial culture:

- ☐ Expand the Special Fund for road maintenance, which presently consists of road user charges from vehicle registration fees, to include a part of the existing and/or proposed fuel levies. This philosophy is based on the principle that motorists should pay for the maintenance of the roads that they use which is reflected by the amount of vehicle fuel they consume.

- ❑ Within the framework of the scrap-and-build policy, establish an autonomous highway authority, out of the existing DPWH, to contract out the design, construction and maintenance of national roads to private entities in accordance with the programs authorised by the Road Fund Board, which shall be strengthened to effectively administer the Special Fund.

In the allocation of limited resources for the national roads system, the highest priority shall be given to the maintenance of existing assets, including preventative maintenance, in order to prolong the useful life of the road network at minimum cost. Next in the hierarchy of investment will be (a) rehabilitation of damaged sections, (b) improvement and widening of heavily-trafficked roads, and (c) construction of new roads, especially developmental roads and missing links in the road network. The program focus will be to improve the quality of the national roads, especially through paving, rather than to increase the quantity of the roads by building new ones. The program will also include the construction of by-pass roads to relieve traffic congestion in major urban centres.

To support the Government's dispersed concentration strategy, the medium-term program will give priority to road investments in regional growth centres and economically lagging regions, particularly where the road densities and paved road ratios are low. This will be conducted through an integrated area development approach. Special attention will be given to Mindanao, where DPWH investment in roads is targeted to increase from only 24% of the total budget in 2000 to 33% in 2004.

To minimise road damage due to vehicle overloading, the allowable vehicle axle loads and configuration will be strictly enforced during vehicle registration and through the installation of more weighbridges. At the same time, the Government will intensify its program to retrofit and strengthen bridges and roads, especially the older ones, to enable them to carry the heavier loads carried by the new generation of vehicles and to meet new seismic design standards.

The on-going Road Information and Management Support System (RIMSS) will be pursued by the DPWH to implement the following priority business processes:

- ❑ road survey and geographic information system;
- ❑ road network planning and multi-year programming;
- ❑ project / contract / procurement management;
- ❑ financial management;
- ❑ contractors billing and payment system;
- ❑ environmental, socio-economic and land acquisition system;
- ❑ pavement / bridge / maintenance management;
- ❑ commercialisation of operations; and
- ❑ a nationwide electronic communications system.

This will greatly increase the capability of the DPWH, in coordination with the Road Fund Board, to plan, develop, and manage the national road system in a more efficient and transparent manner.

4. Targets

To attain development goals in line with the policies and strategies set out above, the medium-term program for transportation infrastructure aims to undertake the priority sub-sector activities which will focus on the following targets:

- ❑ National arterial roads (16,799 km) will be 90% paved by 2004, compared to 70% in 2000. This will require the paving of 3,358 km of road and the rehabilitation / widening / upgrading / construction of 2,504 km of road.
- ❑ National secondary roads (13,079 km) will be 65% paved by 2004, compared to 51% in 2000. This will entail the paving of 1,838 km of road and the rehabilitation of 1,086 km of road.
- ❑ National bridges (276,878 lineal metres) will be 95% permanent by 2004, compared to 89% in 2000. This will involve the reconstruction of 16,612 linear metres of temporary bridges, the improvement of 36,494 linear metres of existing bridges, and the construction of 4,211 linear metres of new bridges.

- ❑ The structure of investments in national roads will shift in favour of regions currently having low road densities and low paved road ratios, as reflected in the percentage shares of investments and target paved road ratios.
- ❑ About 271 km of BOT (build, operate, transfer) inter-urban expressway along heavily-trafficked corridors will be built, including the North Luzon Expressway (widening of existing facility), the Southern Tagalog Arterial Road (STAR) or Batangas Expressway (Lipa-Batangas City), the South Expressway (widening and extension to Lucena) and the Subic Clark-Tarlac Expressway.
- ❑ The medium-term program will focus on the upgrading of arterial roads leading to regional growth centres, with special attention being paid to Mindanao and other underdeveloped regions.
- ❑ Major Roads Supportive of Priority Tourism Areas, including Manila, Cebu, Davao, Subic/Clark and Baguio, will be improved or constructed.
- ❑ The quality of strategic roads will be improved to stabilise the peace and order situation in areas affected by armed conflicts and, therefore, provide for an environment more conducive to economic growth.

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Road Development in Samoa: Challenges and Opportunities

Honorable Faumuina Liuga
Minister of Works, Samoa

1. Introduction

Whilst we consider Samoa to be progressive and contemporary, with a comprehensive program of Agency reform and the on-going development of technical and administrative standards, we know that others are also wrestling with the issues related to the provision of infrastructure to meet community expectations whilst at the same time coping with diminishing funding. Accordingly, we consider this forum (and others to follow), an excellent opportunity to learn first-hand how nations similar to Samoa, are managing and to network and exchange ideas.

2. Current Challenges

In order to undertake Road Development Programs, the challenges confronting the Ministry of Works include, but are certainly not limited to, the following.

- ❑ The loss of trained staff, especially in the technical and contract administration areas. Government Agencies, of necessity, operate on limited budgets and, accordingly, are often unable to pay the high salaries offered by the private sector. Consequently, the Ministry finds itself in a situation where it is a training-ground for professionals. With the loss of trained staff, it becomes increasingly difficult to monitor contractor performance; develop, implement and audit Quality Assurance / Control Strategies; and manage the infrastructure asset generally.
- ❑ There is a need to develop staff-retention incentives through improved salary structures, and to provide of training and the opportunity to work with experienced ex-patriots. The development and implementation of improved working conditions and equipment (which come at a cost), and an attractive working environment, coupled with recognition for outstanding performance, should go a long way towards retaining good staff. It is imperative that the important part that all staff play in organisations is acknowledged, and that not too much emphasis is placed on "tier structure" or "relative importance". The great American political commentator Thomas Paine once noted that "men often oppose a thing, simply because they have had no agency in its making".
- ❑ The development, implementation and driving of sound, relevant asset management systems, capable of planning and prioritising the needs of the road network, are now employed around the developed world. Samoa is in the process of implementing its own asset management system, which will go a long way towards overcoming the current ad hoc methods of determining works priorities. However, the challenge of training and retaining staff capable of running these systems, and thereby ensuring its use and sustainability, remains.
- ❑ Another challenge is the provision of sensible, affordable service standards in the face of an increased public awareness (and therefore, expectation) of what overseas communities are enjoying. Whilst, ideally, the level of service provided should be capable of meeting all of the community's needs, the real challenge is to provide the best range and level of roading services commensurate with income.
- ❑ Climatic challenges for road development and maintenance are real and closely aligned with the preceding issue. It is imperative that there is sufficient knowledge of the prevailing climatic conditions to ensure that overseas design standards – especially temperate-climate standards – are simply not "transplanted" into another environment without due note being taken of the possible impacts. This has happened in the past, resulting on some occasions in the need to increase the level maintenance of the roads and drains because the standard adopted was not suited to the prevailing conditions. Samoa is moving

towards developing its own, relevant, road-design and construction standards – which will reflect local construction materials, traffic volume forecasts, weather conditions and construction technologies – rather than adopting overseas standards which specify inappropriate road profiles, drainage systems and materials performance characteristics.

Whilst there are many challenges that confront road agencies from within their own organisation, there are also several challenges for the agency in relation to its dealing with the private sector. The two sectors – public and private – benefit greatly when each is well informed, skilled, well resourced and contemporary. They become vibrant, efficient and capable, which inevitably results in the provision of a high level of service and value for money.

It is imperative, therefore, that the road agency has an full understanding of what it wants, has carefully determined its affordability, has the funding available to effectively carry out these works and is capable of providing trained human resources to oversee the performance of consultants and field contractors.

3. Opportunities

These are several opportunities within the Ministry of Works with respect to road development, including the need to:

- ☐ become more focused on infrastructure asset management;
- ☐ empower the agency – where necessary;
- ☐ undertake research and development in problem areas; and
- ☐ develop / enhance / utilise a system for rationalising road needs.

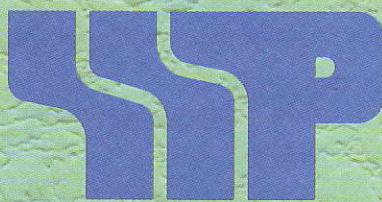
There is no doubt that one of the most significant contributions that many road agencies can make to the community is in relation to road safety. Opportunities include:

- ☐ community road safety education programs;
- ☐ the provision of improved traffic administration systems;
- ☐ the development of improved, and enforced, vehicle-safety inspection criteria; and
- ☐ the development of improved driver training schemes for both the private motorist and drivers of public vehicles.

Opportunities outside the Ministry of Work include the development of the private sector – across all elements of activity relating to road development – in relation to gaining an enhanced understanding of agency requirements and therefore, service delivery.

Dengan Ingatan Tulus Ikhlas

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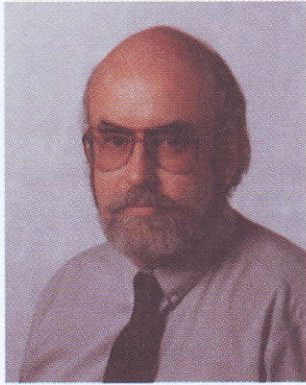
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Biography: Kieran Sharp



Kieran Sharp graduated from the University of Melbourne in 1975 with a Bachelor of Engineering degree. He joined the then Australian Road Research Board (ARRB) in 1976 as Assistant Publications Officer and was appointed Technical Editor of ARRB, and Editor of *Australian Road Research*, in 1977. He commenced research activities in 1980 with his work on interlocking concrete pavements, for which he was awarded a Master of Engineering from RMIT in 1986.

Kieran was appointed the Manager of the Australian Accelerated Loading Facility (ALF) program in 1990 after being involved in a range of pavement- and materials-related research activities through the 1980s, including working as a consultant to the NAASRA Review of Road Vehicle Limits, the Australian asphalt industry and the Organisation for Economic Cooperation and Development (OECD). Recent involvement in research projects includes the production of the revised Austroads Pavement Design Guide and the Austroads/NRTC project on Performance Based Standards for Heavy Vehicles.

He was appointed Business Manager, Asset Technology – an amalgamation of the pavements, materials and asset management research groups – in 2001.

Kieran is the ARRB representative on the Austroads Pavement Reference Group and the Austroads Environmental Reference Group. He was appointed Editor of the REAAA Journal and to the Editorial Board of the International Journal of Pavements in 2001 and Chairman of the REAAA Technical Committee in 2002. He is a member of the American Concrete Institute Committee 325: Concrete Pavements and TRB Committee A2B09 on Accelerated Pavement Testing and various Austroads and industry-based Project Steering Groups. He was a member of the OECD Scientific Expert Group IR6 “Co-operative International Research Program into Dynamic Loading of Pavements” (DIVINE) project, including the Editorial Committee.

11th REAAA Conference

The 11th REAAA Conference will be held in Cairns, North Queensland, Australia, on 18-23 May 2003. The Conference will be held in conjunction with the 21st ARRB Transport Research Conference. The theme for the Conference is "Transport – Our Highway to a Sustainable Future".

This Conference will be the major transport and road research Conference in the Australasian region in 2003. The Conference program will feature a day of special sessions and workshops with a regional focus. Technical sessions addressing the full range of issues of interest to the region will be conducted.

A special feature of the Conference will be the Katahira Awards for most outstanding papers. These prestigious awards are named after a Past President of REAAA who bequeathed funds to encourage young professionals in the region. Entries will be rated on three criteria: originality and level of innovation; technical excellence; and relevance to region. The entry conditions are as follows:

1. The author must be under 40 years of age (if more than one author, at least one must be under 40).
2. The author must be a member of REAAA or work for an Institutional Member of REAAA.
3. The paper must be presented to the 11th REAAA Conference in Cairns in May 2003 or published in the REAA Journal between the 10th and 11th Conferences.
4. The paper must not have been published elsewhere in the same form.

A special coinciding event will be the Heads of Road Authorities (HORA) forum, bring to the Conference the most senior executives of more than 20 national road agencies from the Asian and Pacific region.

Special 'early bird' registration discounts will be available. Full details can be obtained from the ARRB Website (www.arrb.com.au) or via e-mail (21conf@arrb.com.au).